AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XXXVIII
No. 22

NEW YORK, MAY 30, 1918

Ten cents a copy
Three dollars a year

What the Continental Red Seal Motor Means to Dealers

"It's a genuine Red Seal Motor."

Thousands of motor car and truck owners will thus refer to their Continental Motors this year.

"It's a genuine Red Seal Motor." That's the answer that hundreds of dealers and salesmen will flash back when the prospective purchaser asks the inevitable first and foremost question, "What motor?"

"It's a genuine Red Seal Motor." The monetary value of these words is well appreciated by the several score manufacturers who use the Continental Motor in their cars or trucks. This remarkable and threefold reputation of Continental Motors —with manufacturers, dealer, and owner— is not an accident. It has been earned. The motor, like the Continental plant itself, is the result of many years of never ceasing work. It embodies a generation of engineering research and experience, the result of exceptional purchasing ability, the workmanship of a trained body of operators.

Present day conditions reveal one evident tendency. More than ever before standard values are coming to the front. The public is fast appreciating the economy of purchasing well known quality in standard units. The Red Seal Continental Motor, therefore, offering as it does, tried and true, well-tested merit, is naturally gaining new sales impetus.

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"It's a genuine Red Seal Motor."

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Editorial Contents, page 3

Advertisers' Index—Next to last page

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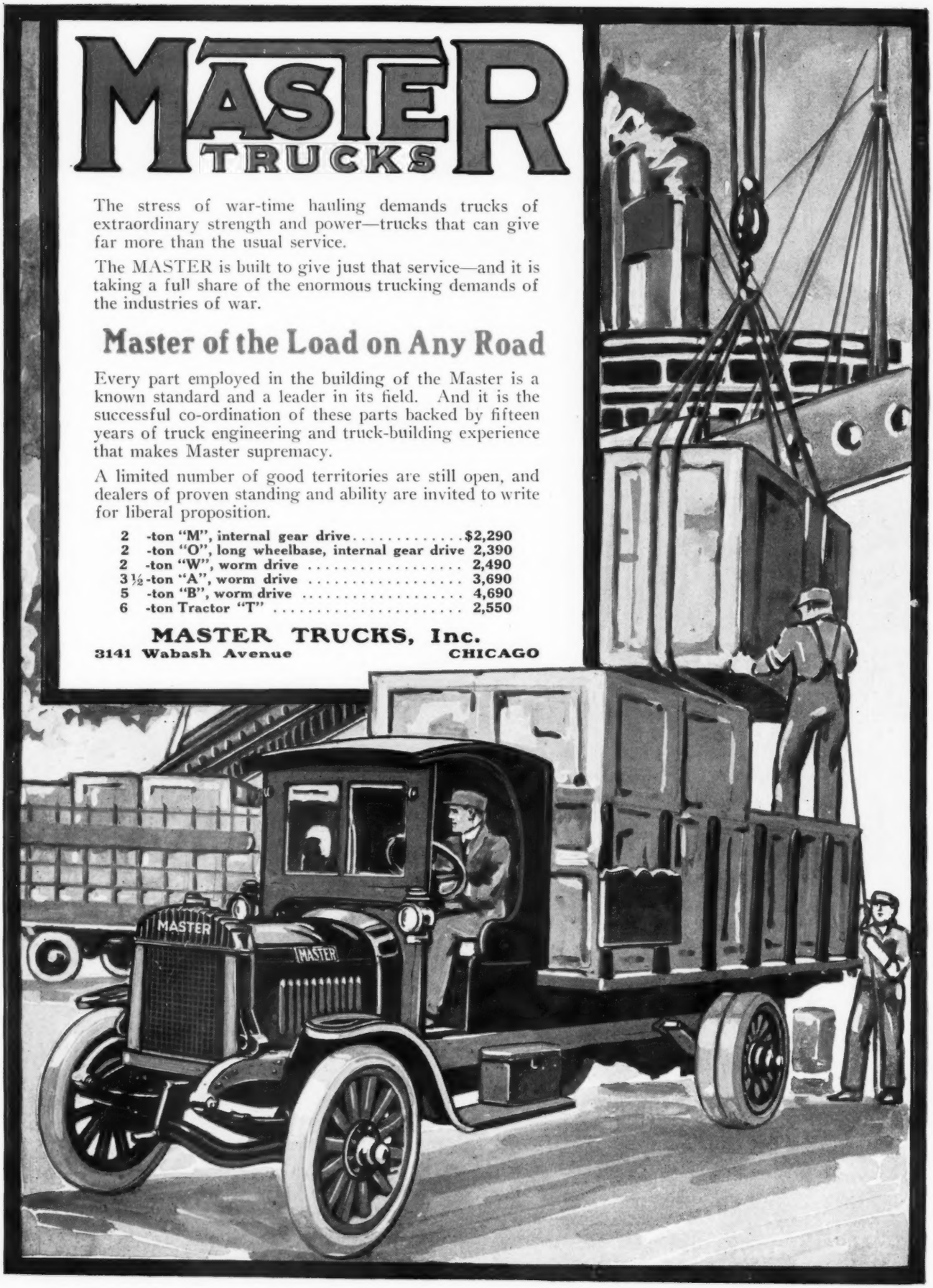


AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXVIII NEW YORK—THURSDAY, MAY 30, 1918—CHICAGO NO. 22

Flag Day—June 14

Every Automotive Factory Should Observe It—Should Be Made Occasion For Impressing Upon Workers the Value of Americanism

PREPARE YOUR PLANS FOR ITS OBSERVANCE

FLAG DAY will be observed on Friday, June 14, and is intended to serve as a means of increasing the efficiency of workers in all factories.

This is a national movement, on which day every factory, no matter what industry it is engaged in, should have a flag-raising ceremony during the noon hour. This should occupy approximately 30 minutes.

If you have not a flag pole at your factory, get one ready for June 14. If you have one, prepare for the half-hour ceremony. If you have no room for a flag pole in the factory grounds get one mounted over the main entrance or in some other place where a ceremony can be held.

The half-hour program should consist of short four-minute speeches to the workers. There may be some patriotic songs.

The object of Flag Day is to impress on workers the value of Americanism. It is hoped to serve as an educational force that will tend to show the value of increased production in war time.

In factories where many of the wage earners do not speak our language, Flag Day has an added importance. Every worker should speak our language. It results in greater individual efficiency. One large factory has declared that its labor efficiency has increased 25 per cent since all of the employees have been taught the English language. The general use of this language has not only increased individual efficiency but it has reduced the number of accidents and has reduced the percentage of rejected materials.

Flag Day, June 14, is but one example of this work of Americanization. Many factories are starting schools for the workers. Special courses in English are being conducted. This work should be started in every factory in which are employees who do not understand the language.

There are in America 3,000,000 foreign-born white persons who do not speak our language. These are not so efficient in these war days as if they spoke the language. It is one of the war problems ahead of us to educate these to speak the language. Many of these come from European countries where illiteracy exists to the extent of 60 to 80 per cent of the population. This makes it still more important why the language should be taught. It will tend to increase the value of the individual.

There are in America 33,000,000 persons born of foreign parentage. There are 13,000,000 foreign-born persons in the country. Many of these are engaged in our industries.

There are in America 3,000,000 who are not naturalized citizens of the United States.

These few facts suggest how necessary it is to have Americanization movements in all of our factories. Increased production is one of the imperative necessities of the day.

Let each factory do its part toward starting this Americanization movement by observing Flag Day as it should be observed, and starting now to get an adequate program commensurate with the importance of the day.

Variety in Aircraft Production

Battle Plane Production Gains Momentum—Big Output of Training Planes—Plans for Future Designs Well Under Way

NEW YORK CITY, May 28—The aviation program of the United States is gaining momentum each week. The period when the factories were engaged in making dies and jigs and tooling up for production is nearly at an end. Over 1500 Liberty engines have been produced to date. Of this number Packard has manufactured nearly 1000. The Lincoln Motors has completed over 300. The Cadillac and Buick are getting into quantity production. Ford will be in production in 2 weeks. Trego should soon be in production. Packard is producing 25 per day at present.

The production of Liberty engines is far from representing the complete airplane engine total productivity of the country. The Curtiss Aeroplane & Motor Corp. has been making strides. Curtiss is in production on the Sunbeam engine, having a contract for 1000 of these with the British government. A small quantity of these motors has been manufactured and production should come along rapidly.

5000 Curtiss Planes Ordered

The second large contract for Curtiss is 5000 type OX-5 eight-cylinder training motors for use in training planes at the several cantonments already established in this country. To take care of this contract three buildings were constructed at one of the factories: an assembling plant, a testing plant and a take-down and re-assembling plant. The rate of delivery on these engines may be judged from the fact that in March the original schedule called for 700 engines, while 835 engines were delivered. In April the original schedule called for 800 engines and 1003 were delivered. During the months of May and June there will be 1000 of these each month, so that at the present time more than half of the 5000 have been completed.

Production Going Ahead

In the production of wings and fuselages or the complete plane production is going ahead. The Fisher Body Co. is now in production on the DeHaviland plane. Production activities of the Dayton-Wright factory were given last week.

Production in other manufacturing zones such as around New York where the Hispano-Suiza engine is being turned out at the factory in New Brunswick, N. J., and at the plant of the General Vehicle Co. in Long Island City, is also going ahead rapidly.

There are still wider activities to our aviation program. The Bugatti engine, which is being manufactured by Duesenberg it is understood, will not go in a plane built in America, but will be shipped to Europe and put in a plane especially manufactured for it there. There are also Liberty engines being shipped to Europe which are being mounted in planes built by our Allies.

Various reports, which may or may not be authentic regarding the Bristol type, have been given out. Some of the aviators flying it regard it as tricky and rather unstable, due, it is claimed, to a down draft on the elevator caused by the upper plane.

Starting Watched

One of the points regarding the Liberty engine mounting which has to be carefully watched and which may require a change in design is that of the fire danger in starting. Owing to the large gas passages to accommodate the high speed of the engine, it is a rather difficult engine to start, requiring heavy priming. This, in starting, causes a flame to issue from the exhaust port, which is in close proximity to the plane. Recently at one of the tests where a flying boat was being tried out, the lower wing was set afire due to the flame issuing from the exhaust port in starting, and a delay of over 2 hr. was necessitated while the wing was patched. Accidents of this kind are apt to result in precarious delays, and this is a matter which should receive consideration. After the engine is started, of course, the draft from the propeller draws the flame away from any of the structural parts of the machine, and furthermore, when the mixture is correct there is no flame in the exhaust.

Criticism Misleading

Criticisms to the effect that our airplane engineers are not going ahead with the program for 1919 are misleading. It has been known for many months that some of the most competent plane designers from Europe have been in this country and have been fitted up with secret designing rooms and testing laboratories where the design of planes for next year and perhaps the year following are under development. Considerable effort has been expended in securing the most competent designing talent that Europe could provide. No notice will be given out as to the design of these planes or when they will go to the front.

There are other new designs of planes under development in this country. One in particular will take the Liberty engine and is, in fact, being designed for this work.

For the United States Navy, Curtiss has developed a flying boat of the HS-2 type, this being a biplane with a 72-ft. span, having a ceiling of 1300 to 1400 ft., and a speed of 85 m.p.h. It uses one Liberty engine, this being of the navy type in which the compression is slightly lower than that used for the army. This flying boat has already been successfully tested out and has given satisfaction.

The Military Affairs Committee of the Senate in Washington, D. C., has declined to comply with the request of Charles E. Hughes that he be given a free hand in the aircraft investigation. Five senators forming a sub-committee will conduct an independent inquiry into airplane production including causes of delay and insufficient production which is claimed.

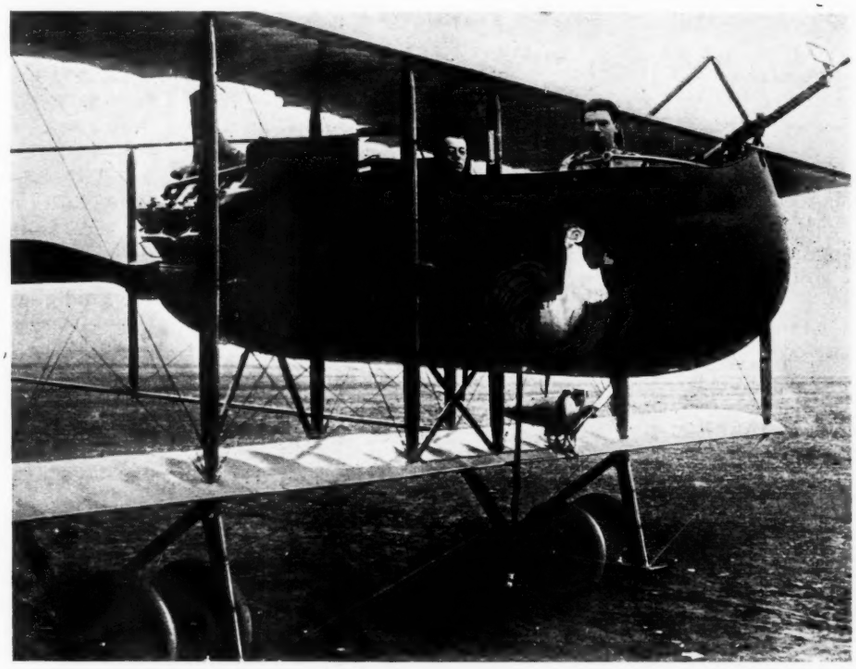
Senator Thomas of Colorado will head the sub-committee and confer with Mr. Hughes to convince him that the committee's investigation will not interfere with that of the Department of Justice. Others on the committee include Senators Reed, Smith, Neu and Frelinghusen.

The Senate committee takes the position that its investigation in conjunction with the Department of Justice opens two distinct lines of inquiry. The Department of Justice is investigating to determine if laws have been violated and if there is ground for civil or criminal action. The Senate committee believes that it should inquire into production for the reasons of delay and other inefficiency in office which it claims will not be touched by Mr. Hughes.

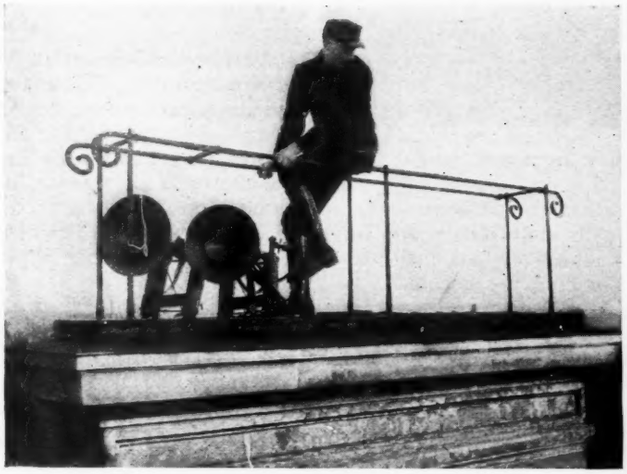
Senator Thomas told the committee that Secretary Newton D. Baker had no objection to the committee investigation and this had considerable weight for the committee.

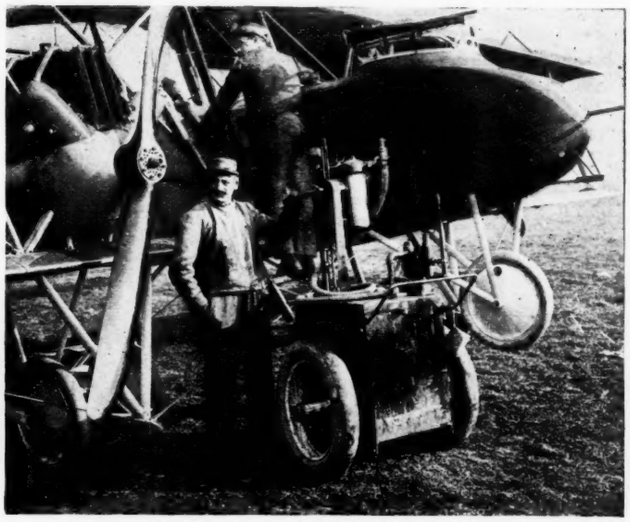
Another argument advanced in favor of a continuance of investigation was that the Department of Justice inquiry will necessary be secret until Mr. Hughes has filed a final report probably 3 months hence. Meanwhile a Congressional inquiry, it is intended, will reveal obstacles to production and point the way to the remedies that can be applied to overcome these difficulties.

Aviation Activities



Latest type of Farnum machine being used by the British for scouting wrok over the German lines





Devices used on the roofs of French buildings for detecting the approach of enemy planes. Right—Pneumatic-tired gasoline filling tanks are used now in France

CAPTAIN GEORGES GUYNEMER
France's Greatest Ace

The Life Story of the Distinguished French Aviator Who Had Accounted for More Than 100 Enemy Fliers

Part I

By W. F. Bradley

A HIGH-SCHOOL friendship was the starting point of the career of France's greatest aviator, the man who became the terror of German fliers, and who finished his glorious life with the unapproached official record of 53 enemy machines completely destroyed and an equal number brought down without official recognition.

Georges Guynemer was a youth of 16 years of age, going through his high-school course at Paris, when he met Jean Krebs, son of Colonel Krebs, a director of the Panhard-Levassor Automobile Co., and inventor of the carbureter bearing his name. There was little in the delicate youth, reared in the quiet country town of Compiègne, under the direct care of loving sisters, to indicate that he would shortly become an air pilot of such fame that France would worship his very name. Young Guynemer was rather clever at mathematics, and had a love for mechanics, which served as an attachment to Jean Krebs.

Captain Georges Guynemer

France was then throwing as much enthusiasm into budding aviation as she had shown some years before in the début of the automobile. The annual automobile shows were being held in the Grand Palais, and it was a part of the school program to take the pupils to these exhibitions on holidays and also to conduct them through the automobile factories which form a belt around the city of Paris.

These trips were the delight of schoolboy Guynemer, who was always the first to get into the factory and the last to get out. His friendship with young Krebs gave him an advantage not possessed by the other boys, for together they spent a considerable time at the Panhard-Levassor factory, where Guynemer learned to drive a car, and made himself generally acquainted with the construction of an automobile.

When war broke out Guynemer was living with his parents at Biarritz. Nearly twenty years of age, he was preparing for his final examinations which would enable him to enter the Polytechnic School at Paris, where he would finish his education. Because of his age, and because he was a student, he was not eligible for military service, but being a youth of dash and determination he resolved that he would enter the army in some capacity or other. Going up for examination, the medical officer refused to accept him, not because of any serious physical defect, but because he was underdeveloped. Refused for the infantry, Guynemer offered himself for the cavalry, but was again turned down, the medical officer declaring that enteritis he had contracted while an infant had made it impossible for him ever to ride a horse.

Fuming at his ill-luck, but declaring that he would go to the front even if he had to hide in a freight car or in the bottom of an automobile truck, as so many high-spirited French youths had done, Guynemer spent a couple of miserable weeks at peaceful Biarritz while tragic events were taking place in Belgium and Northern France.

This district had become an important airplane center by reason of the airdrome at Pau, only a few miles away; but despite the fact that he had once had a ride in a plane, unknown to his parents, and that in consequence he had resolved to become a professional aviator, young Guynemer appears to have forgotten all his old love until one day a plane capsized when alighting on the beach.

He got into conversation with the pilot and asked him how it was possible to enter the Air Service. The advice given was to offer himself as a volunteer to the commanding officer of the aviation depot at Pau. The next day he forced an entrance into the captain's office and pleaded to be allowed to serve in the Air Service in any capacity. Acquainted with the two previous refusals, and not favorably impressed by the sight of this girlish figure, the officer hesitated, then grudgingly admitted that perhaps he might make use of him as a pupil-mechanic.

This was Guynemer's chance. He suddenly remembered he knew how to drive a car, he recalled the hours he had spent in the Panhard-Levassor factory with Jean Krebs, and he pushed home this advantage with such vigor that he was accepted and entered the French army, without a medical examination, in the capacity of second-class mechanic.

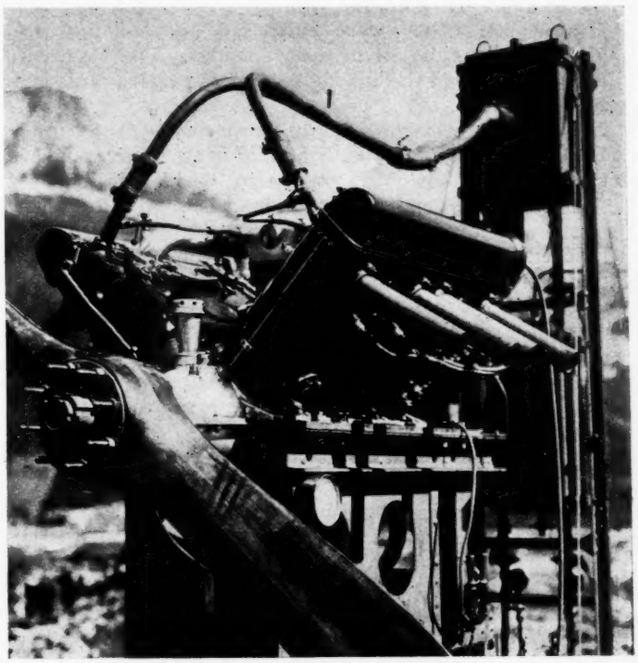
For 5 months Guynemer filled gasoline tanks, washed airplane engines, dragged machines across the field. Meanwhile he kept his ears open for every bit of technical information and profited by what he saw and heard by reason of his good high-school and college education. By the end of 1914 France had come to realize some of the importance of the rôle that the airplane was to play in the war and was looking around for recruits to train as fliers. With some personal influence from his father's friends, Guynemer was accepted as a pupil in one of the new flying schools, where after a week's work shoveling snow he was introduced to a Bleriot monoplane fitted with a 25-hp. Anzani three-cylinder motor, with which it was possible to make hops, but never to get more than 6 ft. off the ground.

Method of Training Aviators

The method of training adopted then, and still adhered to, consisted of making the pupil fly alone from the beginning, under the general control of an instructor, who remained on the ground, watched his pupils and corrected and advised them after each trip. The first machine, being under-powered and having clipped wings, could not get off the ground, and was only intended to teach the pupil to travel in a straight line and become familiar with the controls. The second machine, of similar construction, but fitted with a 60-hp. Anzani air-cooled engine, was capable of flying at a speed of about 40 m.p.h., and with this the pilot practised getting away and the making of correct landings. Then followed the height test and three cross-country triangles, with a couple of landings on each. After this experience on a slow Bleriot-Anzani the pupil was given a Bleriot machine with a Gnome motor; and if successful on this, a Morane-Saulnier or a Nieuport scout.

Guynemer was just 4 months in going through his course of training, at the end of which time he was sent to the front as pilot in a pursuit squadron equipped with Morane-Saulnier parasols—monoplanes with the wings above the fuselage. This squadron later became the famous Group No. 3, known as the Cigognes, all the members of which were cracks, among them being Vedrines, Heurteaux—now in America as instructor—Dorme, De La Tour, and Georges Boillot, the famous Peugeot race driver, who was killed in an unequal fight with seven German planes.

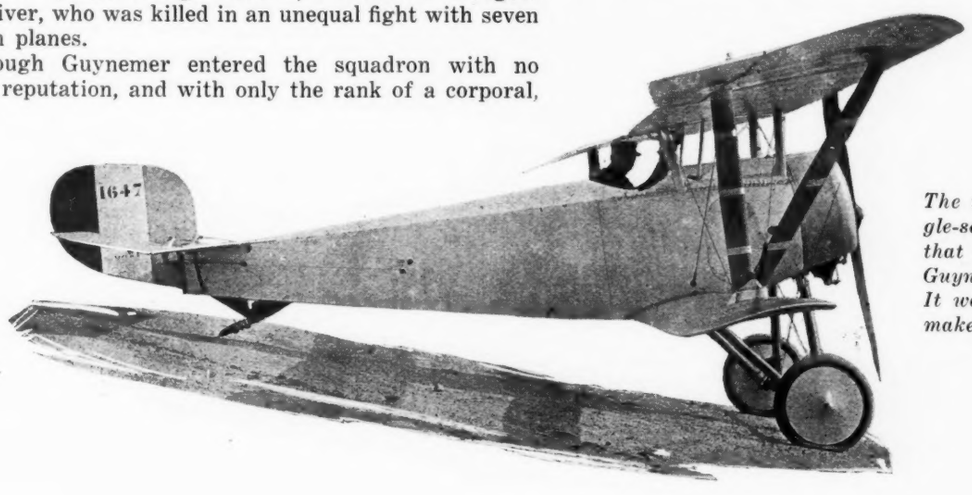
Although Guynemer entered the squadron with no special reputation, and with only the rank of a corporal,



One of the Hispano-Suiza engines undergoing a block test in the high altitudes of the French Alps

he had shown great promise by the minute care with which he had gone through his training and his unlimited enthusiasm for everything connected with flying. His 6 months as a mechanic had been valuable experience, for they had made him acquainted with the entire construction of engines and planes. He was not content to take a plane which had been prepared by strangers and fly it to the best of his ability, he lived with his machine, verified every detail, and, when weather conditions made flying impossible, would often sit in his machine for hours verifying, experimenting, and thinking out his line of action in aerial combats.

When Guynemer joined his squadron, aerial fights were comparatively rare, for machines had not been designed for specialized uses, and pilots generally were of the opinion that flying risks were sufficiently high without adding to them by fighting one another. Thus the first few months of his service at the front were spent in piloting airplanes for observation work, in which he displayed remarkable coolness under fire. By the mid-



The type of Nieuport single-seater pursuit plane that was used by Captain Guynemer for some time. It was in a plane of this make that he won his first air battles

dle of 1915, however, the Germans, in retaliation for the bombardment they were suffering, adopted fast scout planes to clear the air of their enemies. The French followed suit, and aerial duels became more and more common.

Guynemer brought down his first enemy plane in July, 1915. He was flying at a height of 12,000 ft., in company with an observer, when they decided to attack an Aviatik. The combat, which lasted about 10 minutes, began at a distance of 150 ft., and toward the end was reduced to 60 ft. During the fight the machine gun on the French plane became jammed. The observer reached down for his carbine, intending to continue the fight with this weapon, but Guynemer shouted instructions on how the gun could be made to act, and while the observer was making the adjustment, Guynemer kept his plane close behind the German so as to be ready to continue the attack under the best conditions.

Attacked at Short Range

About 6 months passed before Guynemer brought down another German machine. He had been supplied with a Nieuport single-seater, which at that time was the finest scout machine in use by the French army. By this time Guynemer's reputation had been made. He attacked fearlessly at short range, and persisted if he did not succeed in bringing down his adversary on the first attempt. In one fight with an L. V. G., at 10,000 ft., he was only 10 ft. behind his enemy when his machine gun refused to fire. Immediately he dived and banked at the same time, but he was so near that he collided with the enemy. A piece of canvas was torn out of the wing, but the Nieuport was able to land in safety.

It is one of the rules in the Allied Services that a pilot shall not be credited with bringing down an enemy unless irrefutable proof is given. On one occasion, while flying very near his own home at Compiègne, Guynemer came in contact with two German machines. After a few minutes' fight the first machine was sent spinning down, and, convinced that it was completely lost, Guynemer went after the second. The German pilot, however, thought it more prudent to make for home, and, being unable to overtake him, the Frenchman began a search for his first victim. Despite a careful inspection from the sky he was unable to find any trace of the German; but, not to be outdone, he landed near his home—it was Sunday midday—found his father, told him what had happened, and asked him to have a thorough search made. The wrecked airplane was discovered before nightfall.

A fight which took place toward the end of December, 1915, nearly a year after he had been at the front, clearly indicates the daring pilot Guynemer had become. Two Fokker machines were observed. The observer of the first machine was killed at the outset, and, the pilot probably losing control of himself, the machine was sent spinning down to earth. The second was a single-seater firing through the propeller. The machine was fast, handy, and had a good pilot aboard. The Frenchman and the German closed up to 20 ft. Guynemer had his machine gun mounted on the top plane and fired by means of a flexible control convenient to his hand. As this control had broken, however, he had to fire with his right hand completely above his head, while controlling his machine with the left hand. In this way he fired 21 shots in 10 seconds. In order to avoid a collision, which seemed inevitable, Guynemer was obliged to rear his machine and literally jump over his enemy, the distance between his wheels and the top plane of the Fokker being not more than a few inches. This appears to have scared the German, who made for home, while Guynemer came back with a broken intake pipe, a fractured rocker arm (the motor was a Rhone) and several bullets in the motor housing and the propeller, as well as in the wheels, the fuselage and through one of the elevator control wires.

Guynemer received the Legion d'Honneur on his twenty-first birthday—Christmas Day, 1915. He had already received the Croix de Guerre with four distinguished mentions. The following February the Germans started their formidable offensive at Verdun, with the object of cutting through the French lines and marching on Paris across the Champagne plains. The enemy had realized the importance of the mastery of the air and had considerably strengthened his fighting squadrons, which were mostly single-seater biplanes with 165-hp. Mercedes fixed-cylinder, water-cooled engines. The machines, which were organized in squadrons of eighteen, with two to four machines in reserve for each squadron, generally operated in groups of six, under the control of a leader. During the first stage of the Verdun battle the Germans undoubtedly had the superiority in pursuit machines, but the French were quick to reply, one of their actions being the despatch of the Cigogne group of five squadrons of twelve planes each. All these were Nieuport biplanes fitted with rotary air-cooled engines, either Gnome or Le Rhone.

Hispano-Suiza engines are tested in the French Alps on specially constructed test benches which are complete in every particular

Soon after arriving at Verdun, Guynemer at-

Captain Georges Guynemer flying in a Nieuport single-seater fighting plane

tacked a group of five and dispersed them. A few minutes later he attacked two other machines. He closed up on the first and opened fire at 30 yd. The enemy replied, and Guynemer received a hail of bullets which cut two of the uprights and one of the cables, shattered the windscreen, and wounded the pilot above the eye, in the jaw and in the cheek. Blinded with blood, Guynemer made a good landing with the German on his tail, and was immediately moved to a hospital in Paris. While he was under treatment, George Boillot, who had been his companion for several months, was brought down with a bullet through the heart while fighting seven Germans in the Verdun district.

Guynemer came out of the hospital in time to take part in the Franco-British offensive on the Somme, May and June, 1916. He was then flying a Nieuport biplane, with which he went out every day, and frequently was in action several times a day. His method of fighting was then well developed. Possessing a machine capable of more than 100 m.p.h. and exceedingly sensitive to its controls, he rushed in close on the enemy's weakest side, but did not open fire until 20 or 30 yd. away. If he missed his objective, he counted on his speed and acrobatic agility temporarily to relieve him from the dangerous situations; but after diving, looping the loop, or banking on a wing tip, he came back to the attack and did not abandon the fight until either his enemy had been brought down or he had exhausted his ammunition. As an instance of the terrifying nature of his impetuous attacks, he once engaged in a fight with a two-passenger German plane carrying two machine guns. After the first few shots the German dived, as if to make an immediate landing; but at the same moment Guynemer's machine gun jammed. Nevertheless, he swooped down after the spinning German from a height of 10,000 to 6000 ft. At this height the German straightened out, and, no more shots being fired, attempted to make for his own lines. Guynemer then swooped right down on him, as if, in accordance with his usual plan, he was going to get within point-blank range and then open fire. The German did not wait for this, but dived again; once more he straightened out, and once more Guynemer swooped down on him. Finally the enemy had to make a landing in the French lines, and while he was on the ground Guynemer made circles a couple of hundred feet above him until the French infantry came up and took the pilot and observer prisoners. This done, Guynemer landed by the side of the enemy plane and informed his captors, much to their disgust, that he had brought them down with a gun which would not fire. It appeared that Guynemer's first shots had broken the altimeter and revolution counter of the German plane and scared the pilot.

Guynemer himself was brought down on several occasions. After a man has been wounded in the air it frequently happens that he is a long time regaining his nerve, and during the first few weeks of his return to the front he is at a disadvantage. When Guynemer went back after being in hospital he attacked an enemy plane in his usual manner, but when within range did not open fire. For 10 minutes he stopped in his opponent's line of fire, but did not reply with a single shot. Landing, he declared that he had done this voluntarily, in order to ascertain if his nerve was as good as before his accident.

It was toward the end of 1916 that Guynemer received his best airplane, a Spad fitted with the Hispano-Suiza engine, and having a machine gun firing through the propeller. This machine, christened "Vieux Charles," was more speedy than the Nieuport, its horizontal speed being about 120 m.p.h. It had better climbing ability, a higher ceiling, and was quicker on its controls. Further, the armament was better, and the position of the machine gun, placed above the motor housing, superior to that of the Nieuport, which had its gun above the top plane.

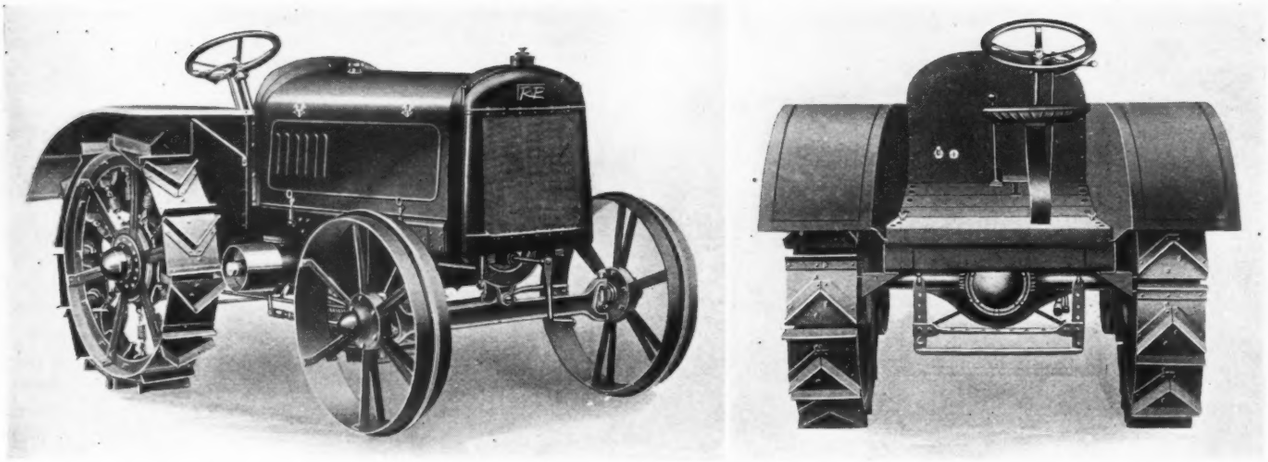
Old Charley, to Americanize the name of the famous airplane, was in scores of fights. Its canvas was shot through and repaired, its spars and propeller were chipped, its motor and tanks were pierced with bullets, but it was carefully repaired and went back into service.

As he became more experienced, Guynemer grew more impetuous, more daring, more determined to bring down Germans. It seemed an inconsistency that this delicately built youth of 21, brought up in refinement and luxury, should become a terrible German slayer, happy only when he was fighting, miserable when the weather or other conditions obliged him to remain on the ground.

The following is typical of his activity: 11.20 a. m., brought down a German in flames; 11.21, enemy plane sent down out of control, passenger killed; 11.25, German down in flames; 11.25½, anti-aircraft shell burst just above the Spad, damaging the radiator and tearing much of the canvas of the upper plane. Guynemer was sent spinning down, apparently out of control, but at 600 ft. from the ground he was able to transform the dive into a glide, struck the ground at 80 m.p.h. and at an angle of 45 deg., the nose of the machine being wedged into the earth like a tent peg. The position was only 100 yd. from the battery which had brought him down.

In the summer of 1917 Guynemer's famous group was moved to the northern end of the line, near Dunkirk. He had hardly reached his new post when he was obliged to go into hospital. Before he was completely recovered he reported for duty, and as the German tactics had changed so that enemy machines usually operated in groups of six or seven, he paired with one of his companions, usually Lieutenant Deullin or Delorme, though frequently he operated alone. It was while working with Deullin that he brought down his forty-ninth machine, a 220-hp. Albatross which he picked out of a group of six and sent down in flames after a fight at 10-yd. range.

(To be continued)



Left—Three-quarter front view of R. & P. tractor. Right—Rear view, showing driver's compartment and wheel guards

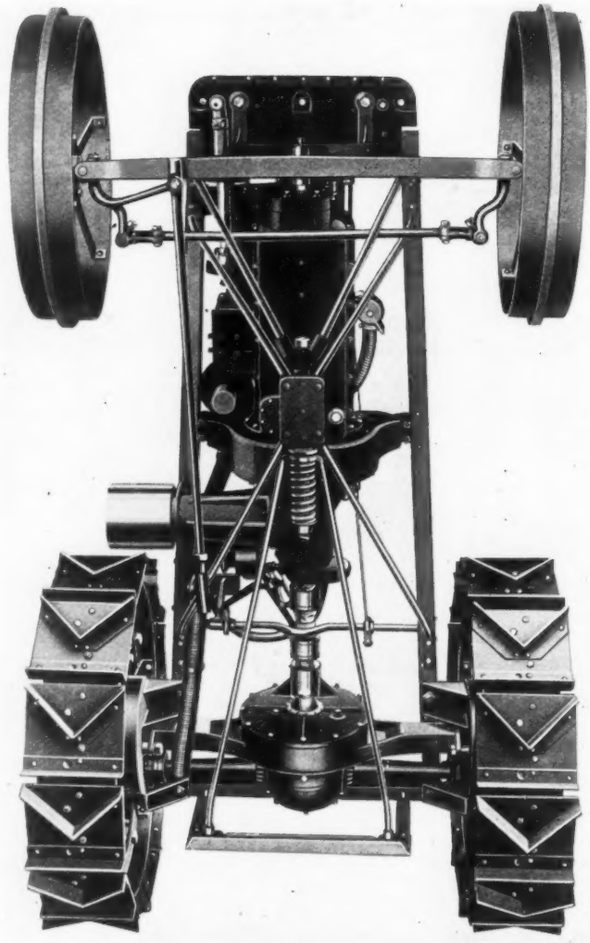
R. & P. Tractor Has Enclosed Drive

Automobile Type Chassis Employed with Unit Powerplant, Transmitting Drive Through Double Reduction Internal Gear Rear Axle

THE R. & P. tractor, product of the R. & P. Tractor Co., Alma, Mich., is distinctly an automobile type. It is built upon a chassis frame and has a unit powerplant, double reduction rear axle gearing, and 40-in. wheels, all these units being arranged, as far as general layout is concerned, according to typical automobile practice.

The tractor weighs 3600 lb., furnishes a drawbar horsepower of 12, a belt horsepower of 20, and has a wheelbase of 70 in. The selling price is $1,485, f.o.b. Alma. According to the makers, the tractor will displace six horses on the farm. It is suitable for all kinds of agricultural work and farm chores, such as filling silos, grinding feed, sawing wood, charging storage batteries, etc., as well as the usual operations of plowing, disking, rolling, harrowing, seeding, etc.

The drive has straight line characteristics, the engine being combined with a disk-in-oil clutch and a selective sliding, three-speed gearbox, so that up to this point the construction is identical with that of motor trucks and passenger cars. A propeller shaft connects from the gearbox to the double reduction gear mounted on the dead rear axle, upon the ends of which rotate the rear wheels. From the double reduction gear and the differential the power is transmitted through the internal gear final drive to the rear wheels.



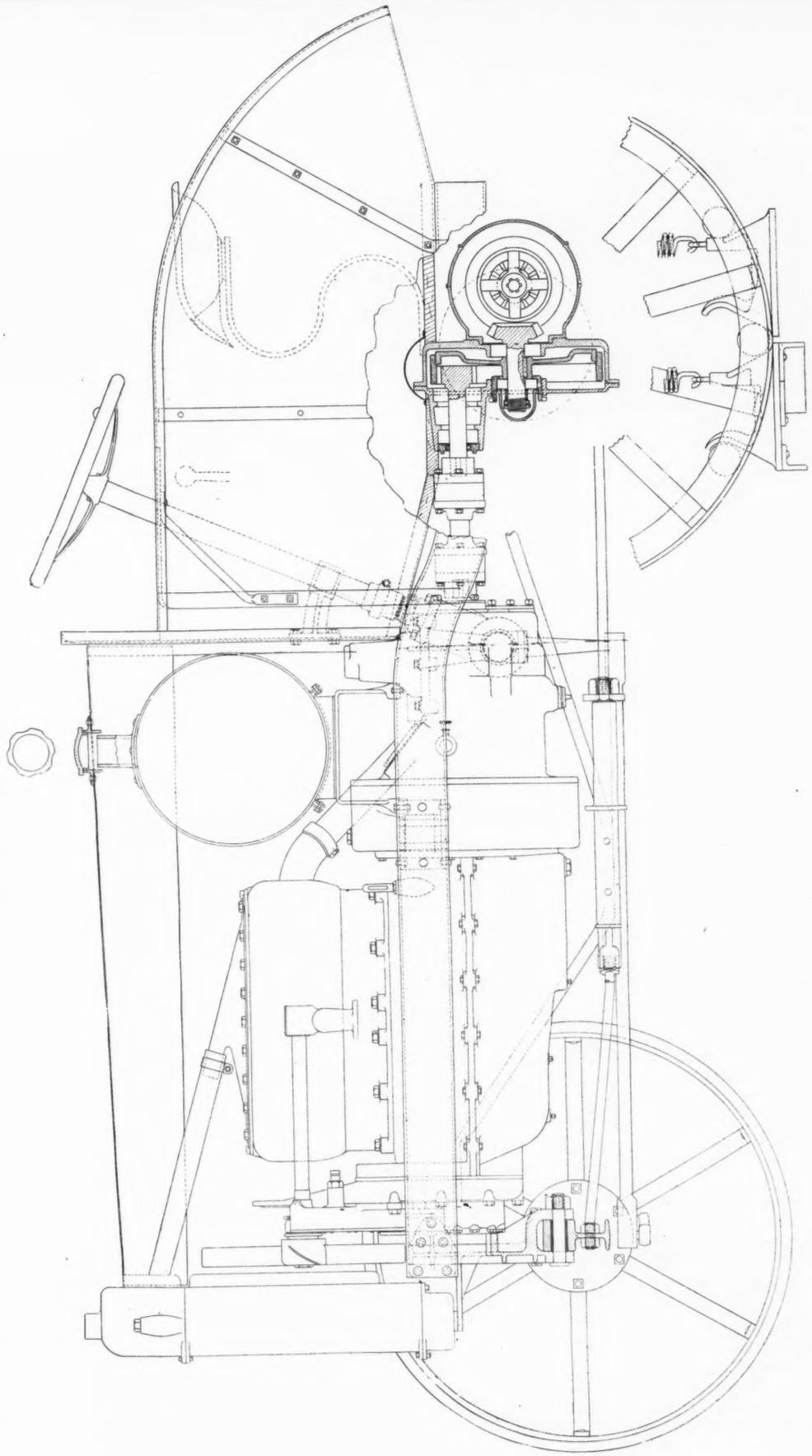
Plan view of R. & P. tractor, showing frame construction

The engine is a block cast four-cylinder, 3¾ x 5¼-in. unit, governed to operate at 900 r.p.m. It is mounted directly on the main frame at three points, two of which are on a cradle forming a cross-member under the clutch housing, and the third of which is a pivot support in front.

The engine is a three-bearing crankshaft design of conventional L-head type. Its piston pin bearings are 2 in. in length and 1 in. in diameter, and the bearings at the lower ends of the rods are 2 x 2¼ in. The dimensions of the three main bearings, front to rear, are 2 x 2¼ in., 2 x 2½ in. and 2 x 3 in. The internal construction of the engine is in accordance with usual L-head practice. The pistons are provided with three rings ¼ in. wide, the bearings are all babbitt-lined bronze, and an automatic splash oiling system of the constant level type is provided, the troughs of which are so arranged that the level is held regardless of engine position. The oil is circulated by means of a gear pump driven off the camshaft.

Cooling is by pump circu-

Side Elevation of R. & P. Tractor



This illustration shows clearly the swivel support of the frame at the middle of the front axle, and the double reduction drive at the rear axle, as well as the action of the drive-wheel pads

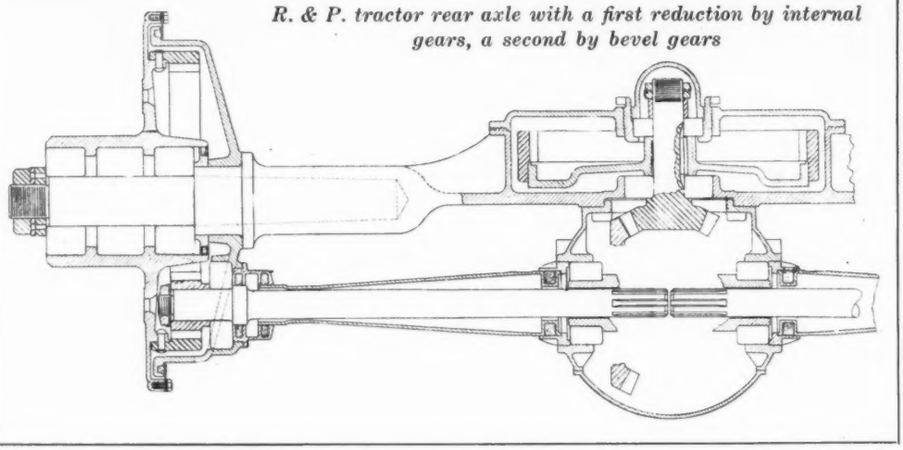
lation, the centrifugal pump forcing water through a 9-gal. cellular radiator with cast tank and frame. Behind the radiator is mounted a fan housing surrounding the 18-in. fan. This obviates loss of fan efficiency by side draft and insures that all the air comes through the radiator.

Gasoline is fed from a 19-gal. tank to a float feed carbureter to which the air is supplied through an air washer. The air washer is mounted at the rear right end of the engine, and the air is led to the carbureter by means of a flexible connection. The automatic governor is connected with the throttle valve and comes into operation at 900 r.p.m., holding the speed at that point. Ignition is by high-tension magneto with impulse starting device, the magneto being mounted on the right side of the engine and driven off the same shaft which operates the fan pulley.

A disk-in-oil clutch transmits the drive to the three-speed gearbox, which is so laid out that at the normal engine speed the low gear gives a tractor speed of 1 1-3 m.p.h. The plowing speed is 2 1-3 m.p.h. and the road speed 4½ m.p.h. The reverse speed is the same as the first forward, 1 1-3 m.p.h. The belt pulley, which is driven through the gearbox and carried on a short, stout shaft on the right side of the chassis frame, rotates at 850 r.p.m., which with a diameter of 8 in. gives a belt speed of 1750 ft. p.m. It has a face of 7 in. All the transmission gears are of 3½ per cent nickel steel and the shafts are mounted throughout on anti-friction bearings.

The rear axle is a Torbensen provided with double reduction gearing. The double reduction gear is mounted on the dead axle and provides a gear reduction of 44½ to 1. The layout of the double reduction gearing can be readily understood from the illustration herewith showing the dead member with the front gear casing removed. The drive is transmitted from the pinion to an annular gear, thus giving the required reduction, and thence passes back to the differential gearing through the live members to the rear wheels. All the gears used in this part of the transmission unit are of high carbon alloy, drop-forged, machine-cut and heat-treated. As in the other transmission units, anti-friction bearings are used throughout, and every moving part is enclosed and runs in oil. The differential is an M. & S., which prevents loss of traction with one wheel on slippery ground.

R. & P. tractor rear axle with a first reduction by internal gears, a second by bevel gears



The frame is of pressed steel channels 4 in. deep of 3-16-in. stock, and with 2-in. flanges. The rear member is pressed steel and the front member is a heavy malleable casting. The brackets and cross-members of this frame are hot-riveted in place, and the frame itself is hung at three points, being rigidly anchored to the rear axle and pivoted centrally on the front axle.

The draw bar is adjustable for height and is carried by a triangular rod arrangement, anchored to the frame at about the center of the chassis. Thus, the pull on the draw bar is carried low and close to the point of application of power. The draft shock absorber is mounted at the forward end of the draft rods and consists of a heavy coiled spring behind the collar at which the draft rods are joined. All the pulling effort is transmitted through the coiled spring.

The steering gear is a worm and nut type, carried on a column mounted on the side of the gearbox and bracketed to the frame. The steering tie rod is located behind the front axle, and the turning radius of the tractor is 12 ft. Grease cup lubrication is provided on the steering joints. The front wheels are 32 x 6 in. and the front axle is a heavy duty truck type of I-beam construction, having drop-forged, heat-treated knuckles and steering arms. The pivoting of the axle in the center gives the axle a 32-deg. distortion range. Owing to the low center of gravity of the tractor, due to the lowness of the heavy masses, such as the transmission, rear axle and drive units, the tractor is capable of taking a severe tilt on ground of unusual rough character without overturning.

The rear wheels are the P. & T., which have been fully described and illustrated in our columns.

Time Study of Aircraft Operations

IT appears that in the manufacture of aircraft in Great Britain, woman labor is largely employed on the woodwork. Some figures have been gathered from a bulletin on women's work, issued by the Ministry of Munitions, showing the time spent on different operations. These figures may be interesting to our own manufacturers of aircraft, for purposes of comparison, though it is realized that the particular design of any part determines to a large extent the time required in its construction.

One of the pieces worked on is a ribbon for a "short" seaplane. The top and bottom booms are supplied cut to length. These are glued to the main and tail lightened web, after the latter has been fitted to suit the grooves, so that the whole rib just agrees with the jig. The vertical and diagonal bracing strips are then cut off from stock lengths of strips and glued and nailed in place, the rib being kept in the jig all the time. The finished rib is then cleaned up and varnished. A period of probation of one week is sufficient for the instruction of the girls, at the end of which time they usually do two ribs per day. With greater experience the girls can average three ribs per day, not including varnishing, and this output is considerably exceeded in some factories.

After a few days' instruction a girl can turn out eight ribs for Maurice Fairman biplanes per day. This time does not include varnishing and drilling the holes in the web. Girls drill these holes, clamping together about twenty ribs and drilling them simultaneously.

Following are the times required for various assembling operations by woman labor. Camera change box rack, 2 hr.; ammunition racks and map board, 5 hr.; camera bottom box and slides, 3 hr.; bomb case, R. L. tube, 3½ hr.; Very's piston ammunition box, 5 hr.; passenger seat board, 25 min.; ammunition rack, 2½ hr.; accumulator box for lighting set, 1½ hr.; camera sponge boxes, 1 hr.

The following operations are performed by female labor under male supervision, all operations including assembling only: Fuselage rear bottom cross member, 10 min.; tail plane inner rib, 30 min.; tail plane intermediate rib, 65 min.; inspection cover frame, 30 min.; fuselage rear body strut tie, 1 hr.; main plane inner wing, tip rib, 30 min.; main plane outer wing, tip rib, nose web, 8 min.; main plane, main rib, nose web, 12 min.; main plane, outer wing, tip rib, center web, 20 min.; tail plane, packing ribs, 9 min.; tail plane, inner rib, nose web, 3 min.

Foreign Trade Department

Australian Commission Favors Alcohol as a Fuel

Price of 62 Cents Per Gallon as Compared with 87 Cents for Gasoline

LONDON, ENGLAND, May 3.—The interest of different nations in fuels for motor apparatus continues, and it seems more certain that after the war different fuels may be used in different countries. It is certain that coal gas will be a motor fuel in certain parts of England. The high price of gasoline in other parts of the world, such as Australia and South Africa, makes it apparent that there may be demands for alcohol as well as gasoline.

Some time ago Australia appointed a committee on alcohol fuel in engines, this committee being a part of the Australian Advisory Council of Science and Industry. An interim report has just been made by this committee, which report in its conclusions is very favorable to the use of alcohol as a fuel. Present conditions in Australia favor its employment first in stationary engines, in the case of which the problem of distribution is less difficult. Moreover, if applied to motor-vehicle engines, it will be necessary to use the alcohol as part of a mixture until engine design has been generally modified, at any rate in small points. The supplies of benzol available in Australia are not sufficient to make a general distribution of an alcohol-benzol mixture possible.

A study of the various sources of alcohol supply reveals the fact that the molasses at present wasted in Australia would suffice for the manufacture of over 3,000,000 gal. per annum.

Further increase in supplies would have to be secured by growing special crops. Of those suggested, sorghum grain has a very high alcohol content, estimated at 87 imperial gal. of 95 per cent alcohol per ton of 2240 lb. This compares favorably with maize or wheat, which give from 80 to 85 gal. Sorghum stalks give about 12½ imperial gallons per ton. These and cassava are recommended for consideration. In particular it is stated that sorghum grain has already been proved by experiment to flourish in districts of Australia where the successful cultivation of maize is impossible, mainly owing to the prevalence of hot winds.

As regards cost, alcohol was quoted in Melbourne at 62 cents per gallon in July, 1917. Gasoline cost 87 cents per gallon in Melbourne in January, 1918. Taking these figures, and assuming a thermal efficiency of 30 per cent in an alcohol engine as against about 20 per cent in a gasoline engine, alcohol has a slight advantage in the matter of cost of fuel per horsepower hour.

A strong point is made of the high thermal efficiency obtainable; also of the freedom of alcohol engines from carbon deposit in the combustion space and of the decreasing liability to knock.

It is stated that the alcohol engine will probably show considerable saving in the matter of lubrication, as the conditions in this respect approach more nearly to those of a high-pressure steam engine than to those of the existing internal-combustion engine. The rate of flame propagation in alcohol is, of course, comparatively slow; thus the explosion is less violent and the engine tends to run cool.

It is stated that the one great disadvantage of alcohol is the difficulty of starting from the cold. Various measures are proposed to overcome this:

1—The carbureter may be preheated by a spirit lamp or flame, and the heat subsequently maintained by the exhaust gases.

2—A little gasoline may be used.

3—The carbureter jet may be heated locally by mechanical or electrical means.

4—Chemical methods may be used to attain the same end.

5—The alcohol may be used as part of a mixture with some other fuel.

Of these proposals, No. 1 does not appear to be applicable to vehicle engines; No. 2 would involve mechanical complications in the way of a very wide range of carbureter adjustment or the use of two carbureters; No. 3 may perhaps prove to be the best plan of all, especially in view of the ease with which electrical heating can be secured on any car equipped with lighting and starting apparatus.

The chemical method appears to be only in the experimental stage, while the last method suggested is one which is likely to be very widely applied during the transition stage, before the quantity and distribution of alcohol are adequate to meet all needs and have been followed by the necessary modifications in engine design.

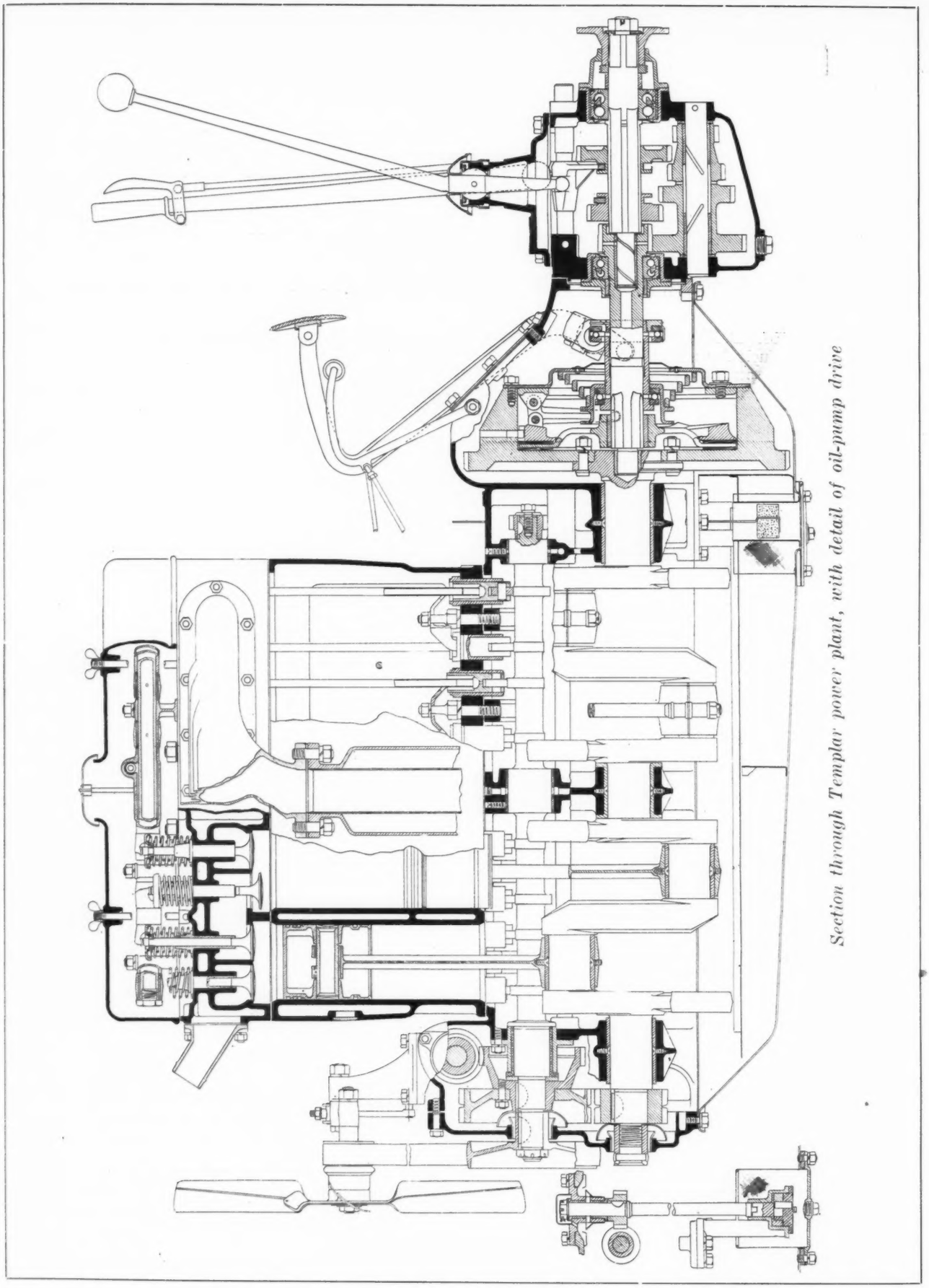
As regards these modifications, the committee finds that, with trifling adaptations, as much power can be obtained with alcohol as with benzine in an existing engine. The precautions necessary to secure this result are a 50 per cent enlargement of the jet and preheating of the carbureter. To get the full advantage of alcohol the compression should be raised approximately to 180 lb. per square inch.

The air supply should be heated before coming into contact with the fuel, and the mixture again heated after the addition of the extra air.

The efficiency of the water circulating system should be reduced and the fuel pipes may in some cases need to be enlarged.

The tests do not show that alcohol has any tendency to corrode the engine, but in view of the possibility of acid being present in the exhaust, provision should be made to drain away any moisture that may form in the pipes or silencer.

In the matter of the denaturants, changes in the law are advised.



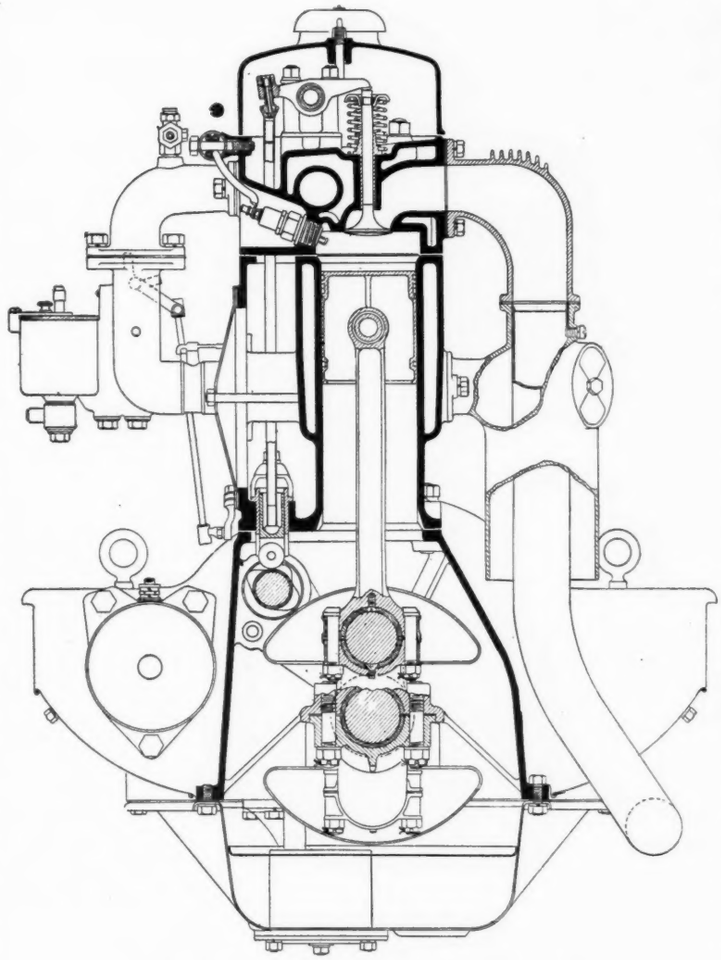
Section through Templar power plant, with detail of oil-pump drive

Templar Four Employs Improved Overhead Valve Construction

Small-Bore, High-Speed Engine Used on 118-In. Wheelbase Chassis—Touring Roadster Equipment Unusually Complete

THE Templar Motors Corp., Cleveland, is increasing production on the Templar four, introduced on the market at the time of the New York show last winter. The Templar car represents an effort to produce what may be called a foreign type of small-bore, long-stroke, high-speed four, in which maintenance cost will be relatively low and output per cubic inch displacement high.

The body length is 88 in., which with a wheelbase of 118 in. indicates a short powerplant, a feature that makes for economy combined with flexibility. The engine is built in the Templar shops and represents an up-to-date adaptation of overhead valve practice. Lightness in the powerplant has been sought by the extensive use of aluminum for the stationary parts and alloy steel for a large percentage of the moving parts.



Transverse section through Templar engine

The 3⅜ by 5½ cylinders are cast in a block, the head casting being separate and the crankcase together with the flywheel and clutch housing cast separately in aluminum. The oil pan is of pressed steel, galvanized; the cylinder block and cylinder head are of close grained cast iron, and the head cover plate inclosing the rocker arm action is of sheet aluminum. One of the unique features of the engine is the direct communication between the crankcase and the valve mechanism compartment on top of the cylinder head, thus permitting the crankcase oil spray to circulate around the rocker arms. The breather and oil filler is placed on top of the valve cover plate.

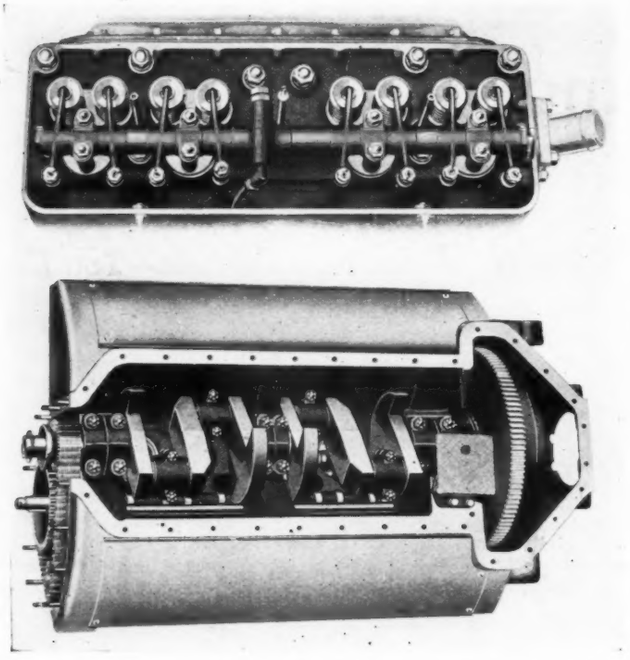
Cast-iron pistons weighing 26 oz. are employed, the pistons being fitted with wrist pin bearings, bushed with Non-Gran bronze. The pistons are designed to prevent oil entering the combustion chamber, by the use of three concentric rings above the piston pin and one below. The lower ring is supplemented by a groove turned in the piston with holes drilled through the piston wall to give an efficient wiping device. A unique feature in the piston is the placing of the second and third rings in one groove. All four of the rings are 3/16 in. and all are hand peened by the Wasson process.

Nickel steel connecting rods are used, machined all over, of I section ⅝ by 1 by 3/32 in. The section is uniform from top to bottom. The lower end has an inserted bronze backed bushing, 2½ by 1⅞ in. diameter, and the caps are held in place by 2 7/16 nickel steel bolts.

Aside from the communication between the crankcase and the valve mechanism housing the valve drive is in accordance with usual overhead practice. The camshaft is machined from a solid forging of 0.20 carbon steel, heat treated, ground and polished. It is driven by a Morse silent chain running in oil. The same chain drives the generator, giving a triangular drive with the generator so mounted that it may be moved to adjust the chain for tightness. Keyed to the camshaft is a helical bronze gear which drives a cross shaft, having on one side an aluminum centrifugal water pump and on the other the ignition distributor. The valve action is transmitted from the camshaft in the usual manner by vertical push rods at the right side of the engine, and it is in the space surrounding these push rods that a clear way is provided through to the head.

Balance weights are employed on the crankshaft, being forged integrally with the shaft of 0.40 per cent carbon steel. The shaft is balanced separately and afterwards in connection with the flywheel. The counterweights permit a relatively high engine speed. At 2100 r.p.m. the engine delivers 43 hp. and its maximum speed is in excess of 2500 r.p.m.

Lubrication is by pressure feed, the oil being circulated by gear pump to the valve rocker shaft—which is hollow—to the timing gears and thence to the engine bearings through the drilled crankshaft. Thus the lubrication of the overhead valve action is taken care of in two ways: First, by the pressure system in which the oil is fed through the hollow shaft into the valve rocker bearing, and then by the oil vapor which comes up the side of the engine from the crankcase. The



Upper—Valve rocker shaft and operating mechanism disclosed by removing cover plate of Templar engine. Lower—Crankshaft and general view into bottom of Templar crankcase

oil which passes through the hollow rocker shaft is carried to the front end of the motor, flowing over the chain drive, sprockets and helical gears, thence returning to the oil reservoir.

With the overhead valve mechanism operating in a bath of oil, silence is maintained. The valve adjustment is also readily maintained by means of a small hexagonal wrench which fits into the end of the adjusting screw on the end of the rocker arm, allowing any adjustment to be made while the engine is running. The valves are of tungsten steel, of 1¾ in. clear diameter, interchangeable and fitted with double springs. No cages are used, the valves seating directly in the head, thus permitting of water jacketed stem guides. The push rods are of steel and tubular in form; they have ball and socket contact with the rockers, and roller contact with the camshaft.

Careful Vaporizing System

A vaporizing system has been laid out to take care of present fuel conditions. The air is preheated by passing it through a stove surrounding the exhaust pipe, led through a passage cast in the cylinder block and thence to the Zenith carbureter. The mixture is carried to the cylinders through the manifold cast in the detachable head. This manifold is entirely surrounded by the water jacket and the mixture in passing through it also absorbs heat from the exhaust passage before it reaches the cylinder. The carbureter is mounted with the float chamber and needle valve plane at right angles to the longitudinal cylinder plane, this being done to render the gasoline level in the float chamber independent of load inclination. An air adjustment and starting primer is mounted on the steering column, and in addition there is an auxiliary primer of the Copley type for cold weather starting.

Ignition, starting and lighting are by the Remy two-unit system, and both the generator and starting motors are mounted on the right hand side of the engine, the flange system of connection being used. The coil is mounted in close proximity to the distributor at the forward end of the engine, thus reducing to a minimum the loss of potential in the high-tension circuit. Combined automatic and manual spark advance is provided.

Cooling is taken care of by the centrifugal water pump driven from the cross shaft, in connection with a Fedders honeycomb radiator of 3½ gal. capacity. One of the features of the engine is the distribution of the water jacket space, particularly around the valves. The plugs are also cooled extensively, due to the fact that they are mounted directly in the side of the head, passing through the water jacket space in such a manner that the cooling liquid surrounds them practically entirely.

A real feature of the car is its easy acting clutch. The clutch itself is the Borg & Beck type, but multiplying levers have been introduced in the clutch operation and permit of easy operation. The clutch is provided with a ball-bearing release collar, and since it is of the single plate type, requiring only a minimum of motion to secure complete disengagement, it has been possible to work out an exceptionally soft pedal action.

Three-Speed Gearbox

The gearbox is a three-speed selective, Templar design unit, built with the engine. The gears are of 3 per cent nickel steel with ¾-in. facings, and the gear shafts operate on annular ball bearings. A Kellogg single cylinder tire pump is mounted on the gearbox, with hose connection coiled under the driver's seat. The pump is meshed by raising a button located on the front floor board. The tire pump and speedometer gears are housed within the gearbox, being thus protected and lubricated.

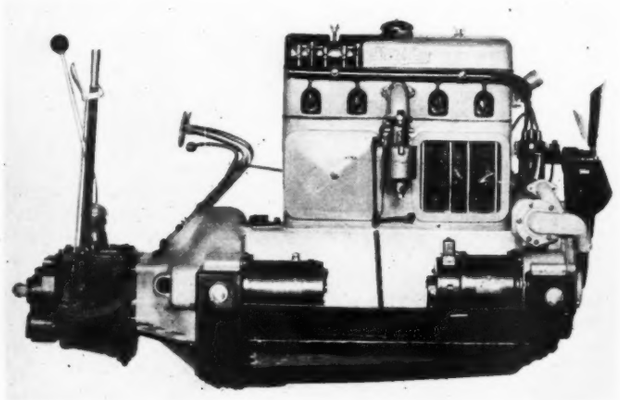
Hotchkiss drive is used, the propeller shaft being a 0.40 per cent carbon steel unit equipped with two Schwitzer universals. The springs are Perfection, chrome vanadium, semi-elliptics, 36 by 2 in. front, and 54 by 2½ in. underslung rear. The spring shackle bolts are bushed with Nigrum oilless bearings, thus reducing the number of grease cups on the car, which total eleven. The spring shackle bolts are ⅞ in. in diameter.

Side-by-Side Brakes Employed

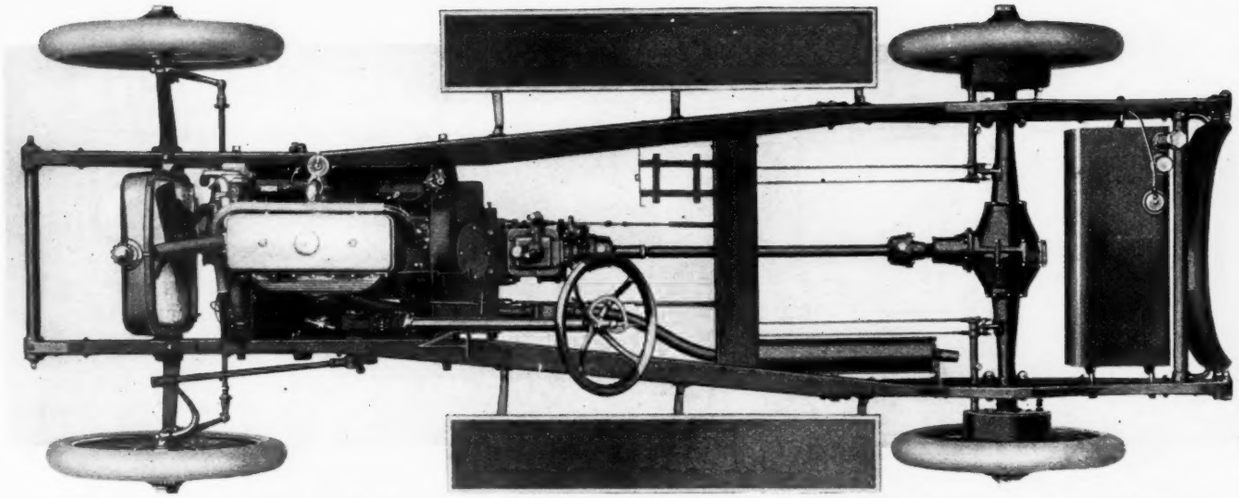
Side-by-side brakes are employed, both service and hand brakes being internal expanding. The drums are 14 in. in diameter, and the service brake 2 in. wide. Adjustment of the brakes is accomplished by turning the wing nuts on the rods beneath the front floor board. Artillery-type wheels having ten spokes in front and twelve spokes in the rear are used. These are provided with Parker demountable rims, one extra rim being provided as stock equipment. The tires are 32 by 4 in., straight side cord with rib tread front and non-skid rear.

The fittings throughout the car are in accordance with current practice, the fenders being full crown. The muffler is a Maxim silencer with Petry cut-out valve. The steering gear is a semi-irreversible screw and nut type with the spark and throttle quadrant and horn button mounted above the steering wheel. The auxiliary air adjustment and the electrical switch equipped with thief-proof lock are mounted on the column just below the steering wheel.

Four types of body are standard, the five-passenger tour-



Right side of Templar engine, with rocker arm cover cut away and one valve cover removed



Plan view of Templar chassis, showing bottle neck frame construction and simple driving and brake linkages

ing selling at $2,085, the four-passenger sportette at the same price, four-passenger victoria, $2,285; and two-passenger touring roadster, $2,385. The chassis alone sells for $1,850. The bodies are given twenty-seven coats in the finishing process and a number of standard color options are offered. On the touring roadster an aluminum body is used. The windshield is a sloping rain vision type equipped with cleaner. Upholstering and trimming are in hand-buffed leather. The doors have nickel-plated double handles, straight bar outside and curved lever inside. They are mounted on invisible hinges and provided with pockets and leather hand pads.

Standard color options on the touring and sportette are Valentine's Tiffany bronze, Light wine or Allegheny blue. Fenders, chassis and splash guards are black enamel. Wheels are natural wood finish. Striping is done only when color, size and location are definitely specified. Monograms or initials are put on when requests are accompanied by scale drawings.

One of the features of the Templar car is its complete equipment. This even includes a compass and a folding pocket kodak. A list of the equipment provided on the different cars is given herewith.

FIVE-PASSENGER TOURING AND FOUR-PASSENGER SPORTETTE

One-man "Never-Leek" top.
Door-Opening curtains.
Johnson plate glass rear window.
Macbeth-Liberty lenses.
Electric motor horn.
Kellogg tire pump and hose.
Tire pressure gauge.
Windshield cleaner.
Motometer.
Petry muffler cutout.
Warner Auto-meter.
Keyless auto clock.
Spot-light.
Dash-light.
Inspection lamp and cord.
Ammeter.
Clum switch and lock.
Oil gauge.
Copley primer.
Complete tool kit and jacks.
Ford cord tires and tubes.
Natural wood wheels.
Five Parker rims.
Wire wheels $100 extra net.

TWO-PASSENGER TOURING ROADSTER

Detachable top.
Warner Auto-meter.
Electric motor horn.
Motometer.
Keyless auto clock.
Kellogg tire pump and hose.
Tire pressure gauge.
Petry muffler cutout.
Windshield cleaner.
Spot-light.
Dash-light.
Inspection lamp and cord.
Ammeter.
Oil gauge.
Copley primer.
Macbeth lenses.
Johnson plate glass rear window.
Stanwood safety step-pads.
Complete tool kit and jack.
Clinometer.
Compass.
Folding kodak.
Six Houk wire wheels.
Six cord tires and tubes.

Standard color options on the touring roadster are Valentine's rich cream, kahki gray, light wine or Allegheny blue. Fenders, chassis and splash guards are painted the same color as the body. The upholstery on the touring roadster may be either red or black leather. The wire wheels on the touring roadster may be either red, white or black. Black is furnished unless otherwise specified.

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DURING March 5024 freight cars were ordered for domestic use compared with 167 a month ago and 8611 a year ago. The Government has asked for bids on 100,000 freight cars and 1500 locomotives, total cost to be approximately $500,000,000, to supply a deficiency in rolling stock which has existed since August, 1916.

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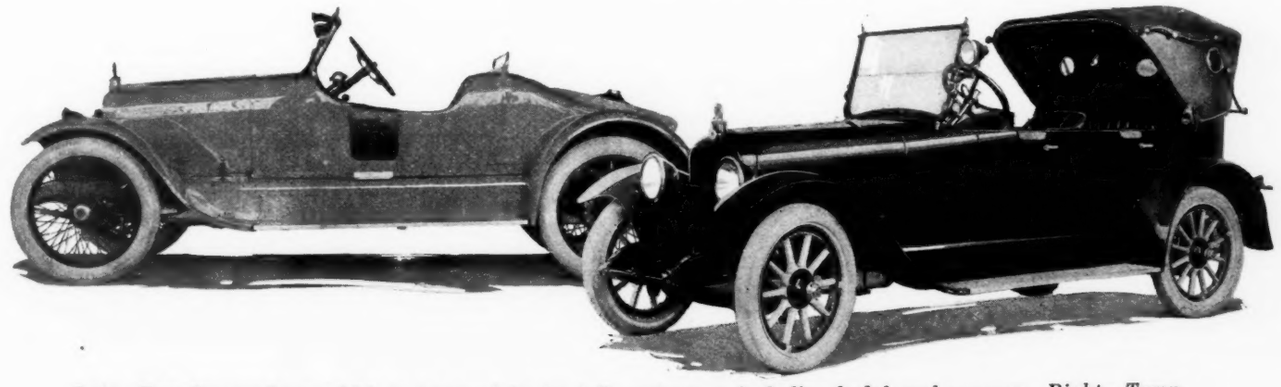
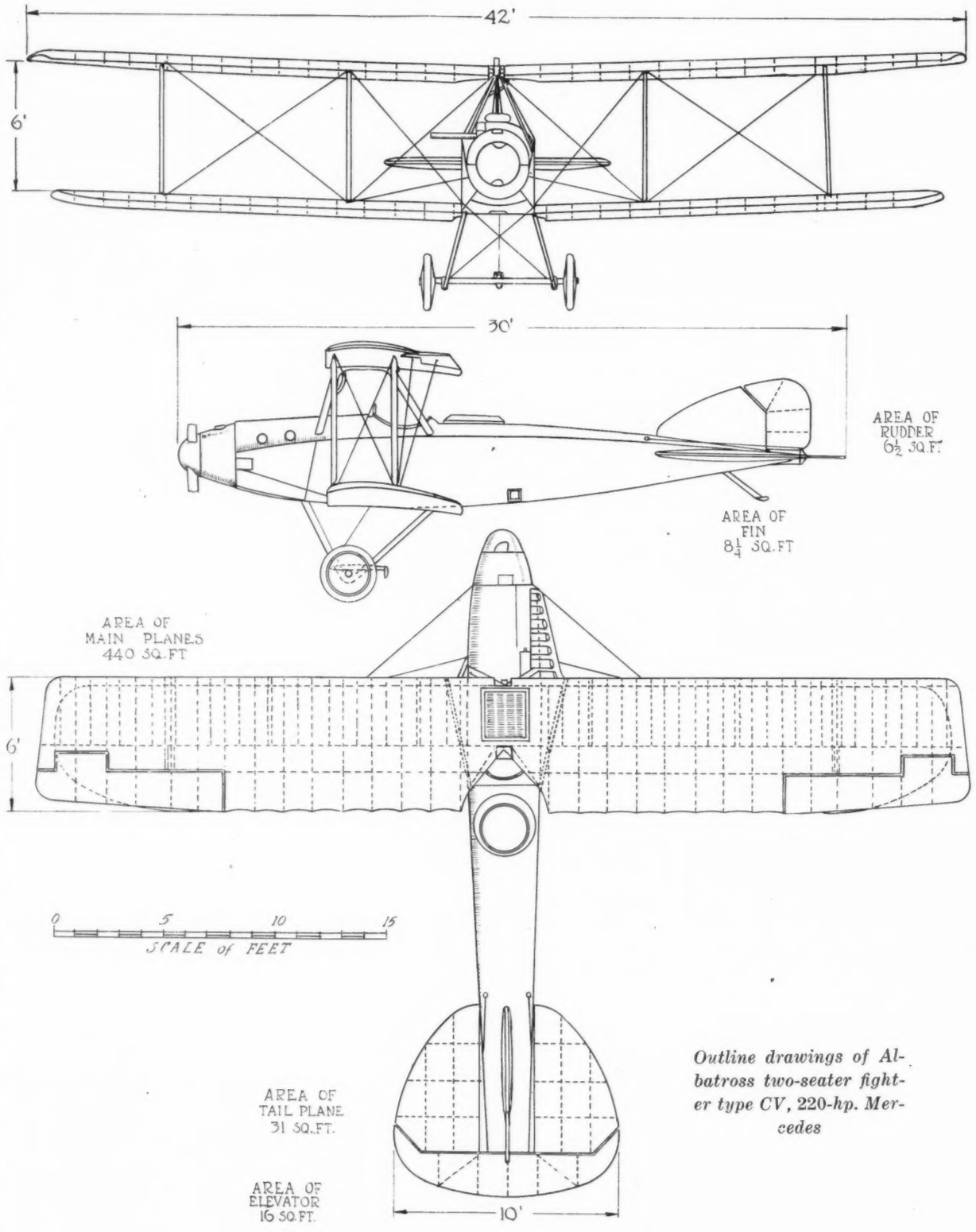
PIG iron production for March indicated new life in the industry and totaled 3,213,000 tons compared with 2,319,000 tons a month ago and 3,251,000 tons a year ago. The first of the month found 344 furnaces active compared with 324 active a month ago. Furnaces are being blown in as fast as the coke supply increases.



Left—Templar roadster which is featured by its full equipment, including kodak and compass. Right—Templar five-passenger touring car fitted with Victoria top



Outline drawings of Albatross two-seater fighter type CV, 220-hp. Mercedes

The Albatross Fighting Biplane—II

Details of the Body Main Rails—Attachment of the Tail Plane to the Body—Form and Method of Attaching Elevator

NEXT in order after the bulkheads of the fuselage, described in the first instalment of this series, come the longitudinal rails. These vary from end to end not only as regards area of section, but also in the different form of spindling out employed at the various points, and in the method of reinforcing with other strips of wood, partly in order to increase their strength where required and partly to make their overall section conform to the various angles and curvatures of the outside three-ply covering of the fuselage.

From Fig. 6 a fairly good idea may be formed of the shape and dimensions of the longerons at various points. The lower one (left hand) is originally of rectangular section, but is lightened from point to point by various forms of spindling and stop-chamfering. Thus at the point B (see key, Fig. 6), the inner face of the bottom longeron is spindled out on its inner face with a curved cutter. At other points of this longeron farther toward the stern various sections are met with, as channel, solid rectangle, and L sections of various proportions. Between the horizontal stern post and the point at which the middle longeron meets the lower one, the latter is reinforced with a triangular section strip, so as to carry the three-ply covering into the sloping side. Similarly at the section A, Fig. 6, the longeron, which is here of solid rectangular section, is reinforced on the outer side with a curved strip, spindled out externally, and with a smaller strip on the lower face of the longeron. This is done partly to strengthen the longeron, which at this point is subject to an increased compressive load, owing to the overhung engine, and also to afford attachment for the three-ply covering, which at this point changes from flat-sided to rounded section where the sides gradually merge into the truncated cone of aluminum which forms the extreme nose of the body proper, *i.e.*, at the point just behind the "spinner" on the air screw boss.

The upper longeron, which is originally of rectangular section, is spindled out to channel and L sections at various points, as shown in X, Y, Z, Fig. 6. To form an attachment for the curved top of the body, the top longerons have glued to their upper face additional strips of triangular section, while at the point Y, Fig. 6, the section is left rectangular

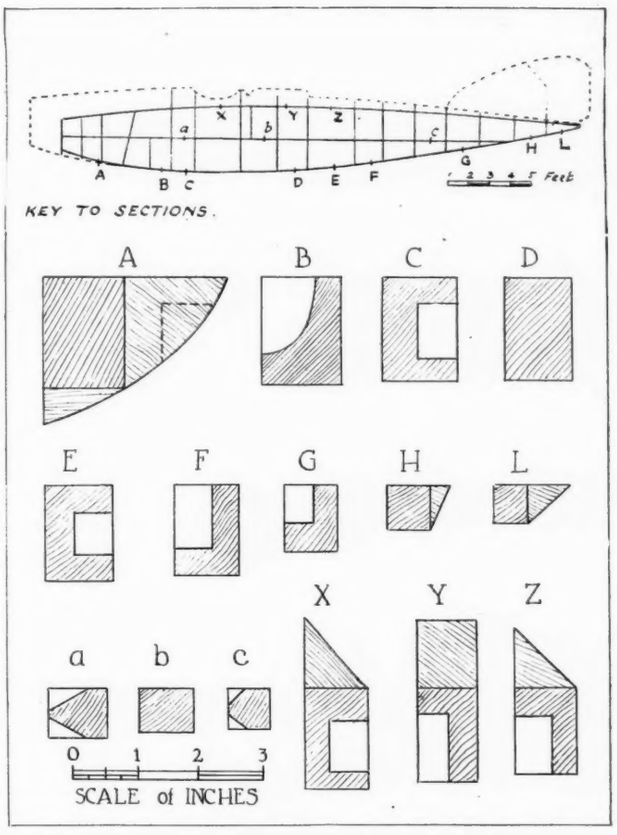


Fig. 6—Sections and dimensions of the longerons of the Albatross biplane

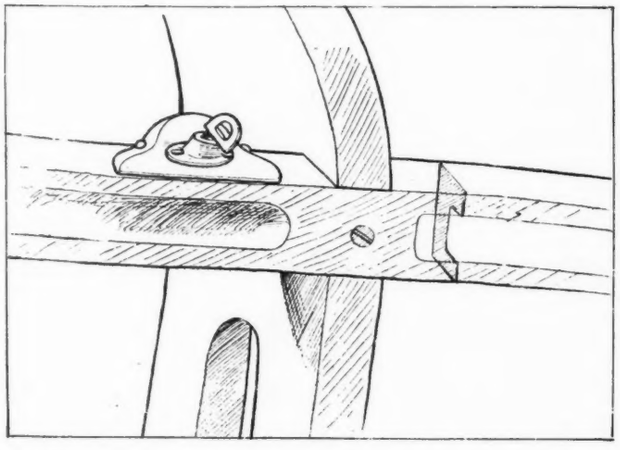


Fig. 7—Sketch showing turnbuttons securing engine cowl to upper longerons. The bulkhead is prevented from shifting by a wood screw going through the longeron into the bulkhead

so as to form a support for the gun ring. In addition to their function as strengthening members these strips serve the further purpose of preventing the bulkheads from sliding along the longerons, as they are cut off where a bulkhead occurs, against the front and rear sides of which they abut. In some places, as, for instance, in the front of the body, where the covering is in the form of an aluminum cowl over the engine, the strips are omitted and the cowl is attached to turnbuttons as shown in the sketch Fig. 7. At such points the bulkheads are prevented from sliding along the longerons by a long wood screw passing horizontally through the longeron into the bulkhead.

The middle longerons, which, as already pointed out, are horizontal, *i.e.*, parallel to the propeller shaft, are of smaller overall dimensions than are the four main longerons. They are of rectangular section, lightened in places by stop-chamfering, as shown at *a* and *b*, Fig. 6.

Fig. 8 shows, in side elevation and plan, the general arrangement of the fuselage, and should, in conjunction with the various sections and key diagrams, explain fairly clearly the general layout of the body. It will be noticed that in plan the sides of the body are straight from the tail post forward to the pilot's cockpit. For ease in manufacture it is an advantage that the ribs of the tail plane should be at right angles to the spars, and in order to effect this it is necessary

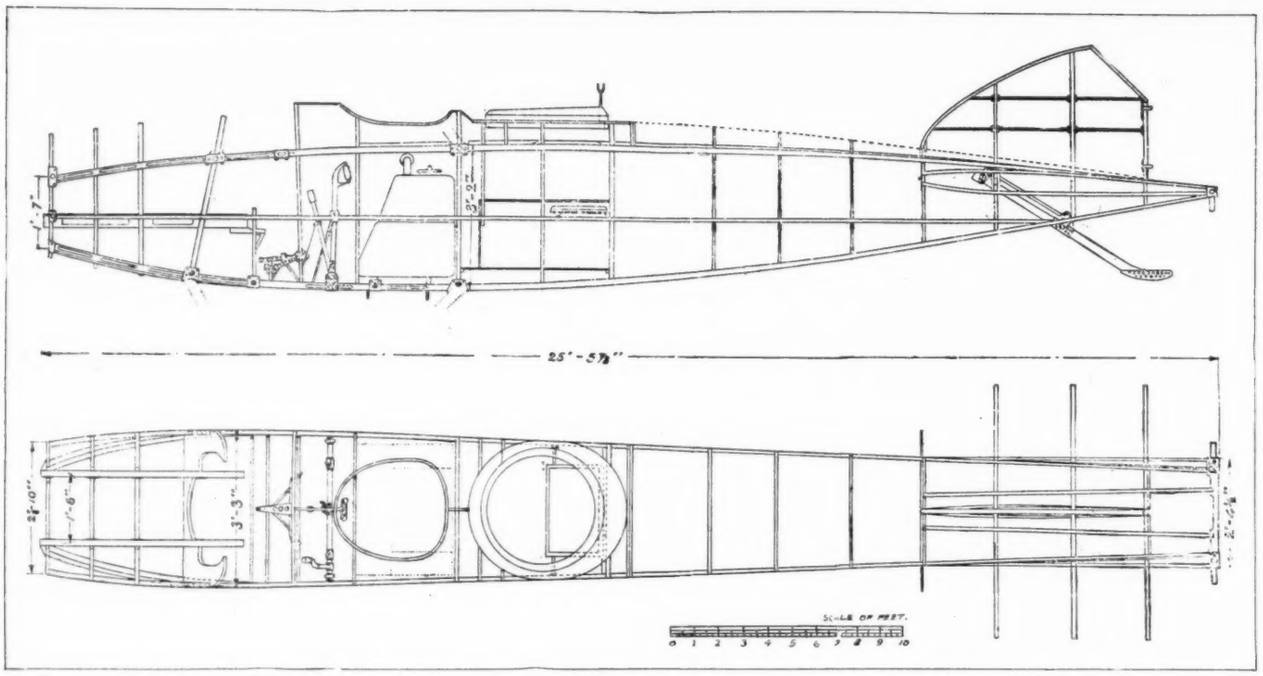


Fig. 8—General arrangement of the Albatross body. Side elevation and plan to scale

that the sides of the body should be parallel for the length of the tail plane. However, to provide for this the longerons would have to be changed from a converging direction to a parallel one, which would necessitate a somewhat sharp bend in them at the point where the tail plane commences; moreover, as the depth of the tail plane is not the same as that of the body, except at the extreme rear, a different course has been followed. From the point where the tail begins, two extra longerons on each side have been built into the bulkheads of the body. These two short longerons have, in plan, a direction parallel to the line of flight, while the main longerons continue on their converging course. This arrangement is indicated in the plan view Fig. 8. In side elevation the short longerons, against which lie the inner ribs of the tail plane, have the same curvature as the tail plane. In this manner the lines of the rear part of the body are not spoiled, while an easy flowing curve is provided for running the tail plane into the body.

Reference has already been made to the peculiar attachment of the tail plane to the body. The sketch at the top of Fig. 9 shows in perspective this attachment, which is also illustrated in the diagram in the bottom left hand corner of Fig. 9. The bulkheads of the body are extended outward to form cantilever beams which support the tail plane. There are three of these cantilever beams, while further support is provided for the tail plane leading and trailing edges as indicated in the sketches. The spars of the tail plane are of the box type, built up of ash flanges with thin three-ply sides, cut out for lightness. These spars are so proportioned that they fit over the cantilever beams, which do not, it will be seen, run right out to the edge of the tail plane, but are finished off just outside the second tail plane rib. No external bracing of the tail plane is provided, the depth of it and the method of mounting being relied on for the necessary strength.

To provide against the tail plane sliding off its cantilever supports, it is secured at the leading and trailing edge. The former attachment is indicated in the bottom right-hand corner of Fig. 9. A sheet steel shoe fits over the corner of the leading edge and inner rib, and through this shoe a long bolt passes, which runs across the body to a similar shoe on the other side.

(To be continued)

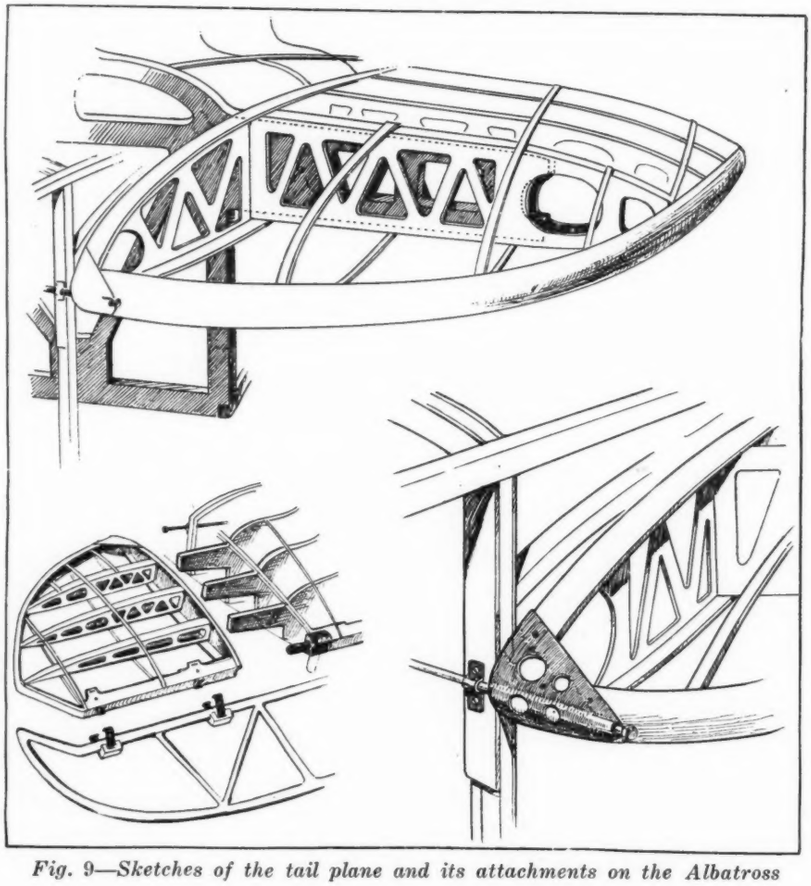


Fig. 9—Sketches of the tail plane and its attachments on the Albatross

Nomography—III*

With Special Reference to Its Use in Engine Design

By F. Leigh Martineau, Assisted by A. Marshall Arter

BEING given the diameter of the spring required and the load it has to carry, say, for example, 1.5 in. and 20 lb., a line is drawn on Fig. 17 joining the load and the size required. This line strikes the line of wire sizes between 12 and 13 S.W.G. The size one or two higher should be used according to the amount of movement required; take in this example the next size larger. A second line drawn from this size shows that such a spring will carry 26 lb. Having ascertained the size of the wire for the load, refer to Fig. 18.

Again, by joining the wire size to the spring diameter in this figure, the safe compression or extension per coil is shown.

The following data are now available:

a. Diameter of spring ... ... 1.5 in. in example.
b. Maximum safe load ... ... 26 lb. "
c. Desired load ... ... 20 lb. "
d. Diameter of wire ... ... 0.104 in. "
e. Safe compression ... ... 0.5 in. "

From the above the compression for load *c* will be

$$e \times c/b \quad \ldots \quad \ldots \quad \ldots \quad (28)$$

or in the example $0.5 \times 20/26 = 0.385$.

The space between the coils will be, therefore,

$$e - e\,c/b \quad \ldots \quad \ldots \quad \ldots \quad (29)$$

or in the example $0.5 - 0.385 = 0.115$, and the pitch of the coils will be

$$d + e - e\,c/b \quad \ldots \quad \ldots \quad \ldots \quad (30)$$

or in the example $0.104 + 0.115 = 0.219$.

Having obtained this result, refer to Fig. 19, and draw a line from the desired length of spring through the pitch of coils as obtained above, and the result will give the number of free coils necessary—in this case 14.

Now it is also known from the data that the pitch of the coils when free is

$$e + d \quad \ldots \quad \ldots \quad \ldots \quad (31)$$

or in the example $0.5 + 0.104 = 0.604$.

A line from the number of coils through this point on the pitch line gives the free length of the spring.

As the pitch when the spring is close coiled will be *d* alone, by drawing a line through this point on the pitch line, the length of the spring in this condition can be obtained.

All the required data for the spring have now been obtained, and a complete diagram of the spring itself giving these data in the most easily used form can be made; such a diagram has been made for the example, and is shown in Fig. 20. Hence C is the free length of the spring of 14 free coils plus 1 dead coil, B is its length under a load of 20 lb., and A its length close coiled. From this diagram the load and the deflection still available can be found for any other condition with the assistance of the scale on the right-hand side.

In getting out designs of an engine, in many instances it is desired to arrange for the swept volume to be a certain fixed amount per revolution. The swept volume per cylinder can be found from the formula:

$$V_c = D^2 S\,\pi/4 \quad \ldots \quad \ldots \quad \ldots \quad (32)$$

or, in logarithmic form,

$$\log. V_c + \log. 4 - \log. \pi - 2 \log. D - \log. S = o \quad (33)$$

This is shown as a nomogram in Fig. 21.

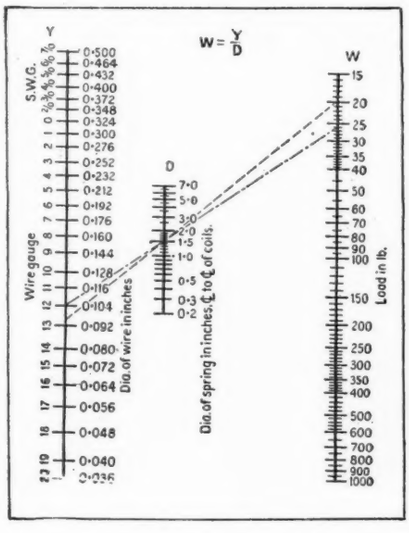
It will be evident that for any volume on the V_c scale, by rotating a line around the point on this scale representing the desired amount, all dimensions of cylinders, *i.e.*, diameters and strokes giving this volume, can be read directly off the diagram.

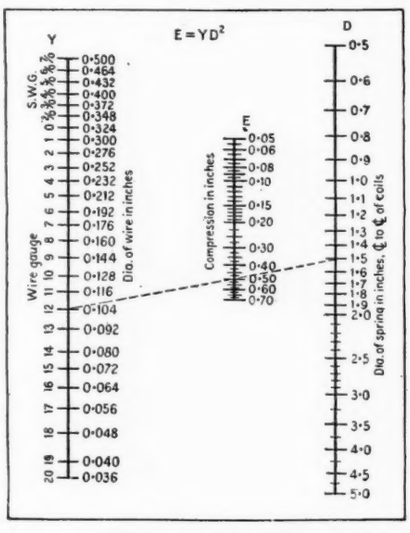
Two further scales, however, are added. These scales *J* and *Q* can be used for obtaining the total cylinder volume by taking the number of cylinders, or the working volume by using the number of working strokes on scale *J* and drawing a straight line to the volume of one cylinder on the V_c scale; the result will be given on the *Q* scale.

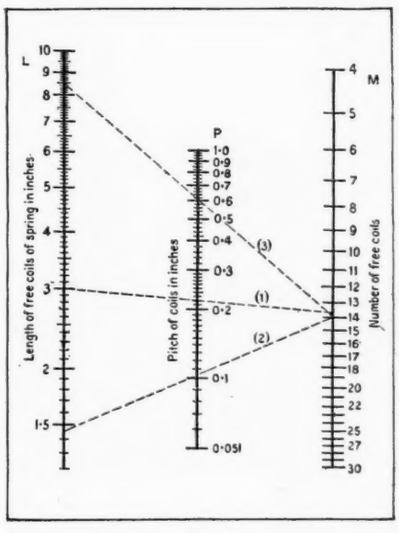
The working volume is useful for all calculations of horsepower, and it will be seen that by this method of expression this diagram becomes available for calculations relating to all engines, whether two or four-stroke, single or double-acting, and with any number of cylinders.

Engines of varying dimension can be compared by taking the horsepower at a standard mean effective pressure, and

*Paper presented to the Institution of Automobile Engineers of Great Britain.







Figs. 17, 18 *and* 19

revolutions per minute. The actual performance can also be compared with the rated performance on the same basis.

For this purpose the nomograms given in Figs. 22 and 22a can be used.

In this case also a four variable nomogram is necessary as the formula is:

$$\text{Hp.} = P_m\, Q\, N/396{,}000 \quad \ldots \quad (34)$$

This can be written in logarithmic form and divided into two parts, as follows:

$$\log. Q + \log. N - \log. X = o \quad \ldots \quad (35)$$

and

$$\log. \text{hp.} + \log. 396{,}000 - \log. X - \log. P_m = o \quad (36)$$

If it is found at any time that the horsepower scale on Fig. 22 does not go sufficiently high, the same scale of Fig. 22a can be used as an addition to it by setting the two in line with the distance from the 100 on Fig. 22 to the 200 on Fig. 22a, measuring the same length as the distance from the 200 to the 400 on the latter figure.

These diagrams are used by joining the necessary point on the Q scale to that on the N scale, so getting a point on the reference line. The straight line from this point through the P_m line cuts the hp. line at the correct horsepower. This diagram, of course, gives the indicated power.

To obtain the area of the inlet and exhaust pipes the working volume Q can also be used. For solving this problem the two nomograms Figs. 23 and 23a have been prepared.

The formula in this case is:

$$v_g = Q\, N/180\, \pi\, D_1^2 \quad \ldots \quad \ldots \quad (37)$$

This, written in logarithmic form and divided into two parts to deal with the four variables, becomes:

$$\log. Q + \log. N - \log. X = o \quad \ldots \quad \ldots \quad (38)$$

and

$$\log. v + \log. 180 + \log. \pi + \log. D_1^2 - \log. X = o \quad (39)$$

Although the preceding paragraph and the diagrams therein deal with the question of the main inlet and exhaust pipes, yet the valve area cannot be obtained in this way nor the area of the individual pipes leading to each cylinder, as in the former case all the gas to or from the engine is presumed to be passing. The valves only deal with the actual volume drawn into the cylinder, and this has to pass in during one stroke only. A further formula is therefore necessary for the valves and individual cylinder pipes as follows:

$$v_g = V_c N/360\, \triangle \quad \ldots \quad \ldots \quad (40)$$

This is treated in logarithmic form and divided into two parts and becomes as follows:

$$\log. V_c + \log. N - \log. X = o \quad \ldots \quad \ldots \quad (41)$$

and

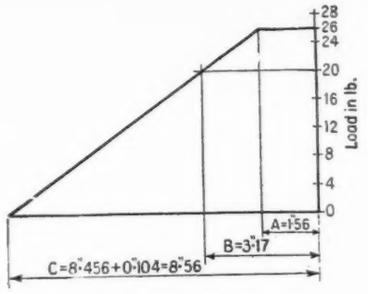


Fig. 20

$$\log. X - \log. 360 - \log. \triangle - \log. v_g = o \quad \ldots \quad (42)$$

The resulting nomogram is given in Fig. 24.

The results in this case are expressed as areas rather than as diameters, as the valve may perhaps not be arranged to lift the necessary height to give full area due to diameter, and therefore in this event the area should be treated as composed of the height of lift and the perimeter of the valve seat.

It will be evident that the subject of the paper is but sketchily dealt with, but it is hoped that enough has been said to show its importance.

It is well to bear in mind that a nomogram should always be made as nearly square as possible in order that the lines may cross one another approximately at right angles as in this manner the errors of reading are much reduced.

A piece of black thread or celluloid rule with a fine line on it in contact with the paper probably gives the best means of reading the diagrams, but neither of these can be used very successfully with a four variable nomogram unless the trouble is taken to graduate in some form the reference line. With four variables a straight edge and fine pencil point is probably the best means of obtaining quick results.

One word of warning must be given about using four variable nomograms, and that is that it is necessary to read only from the scales and the reference line in the correct order. This order can be found from the formulæ given on the diagrams, X in each case expressing the unknown represented by the point on the reference line.

The authors consider that they personally owe a debt of gratitude to M. d'Ocagne and Lieut.-Col. Hezlet for having by their work drawn their attention to such an interesting and useful method of saving both labor and time and reducing the chances of arithmetical error.

APPENDIX

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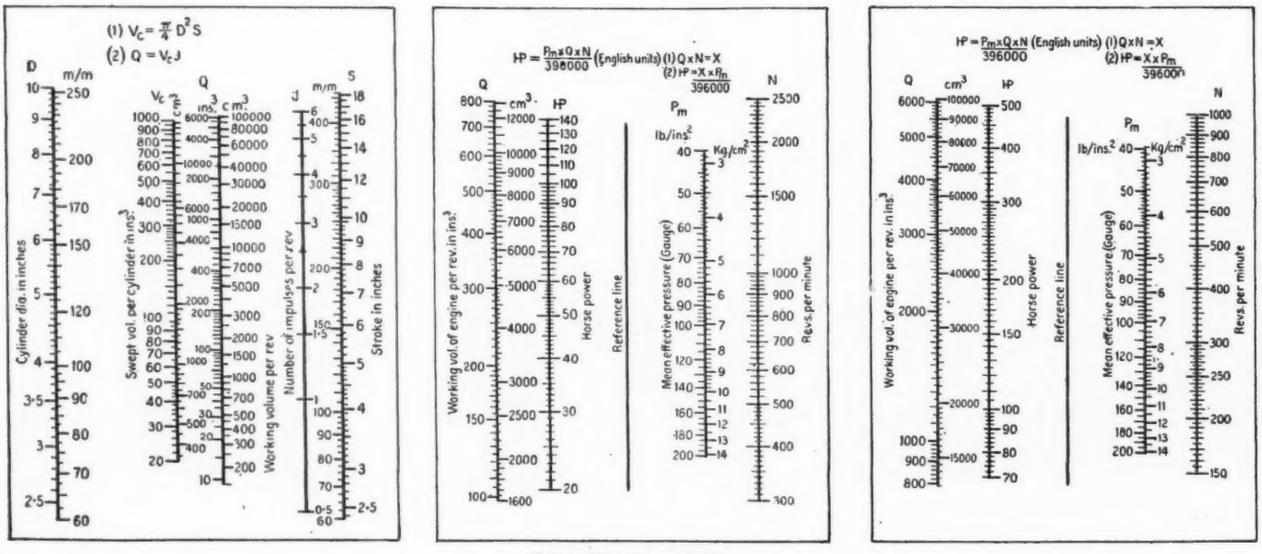
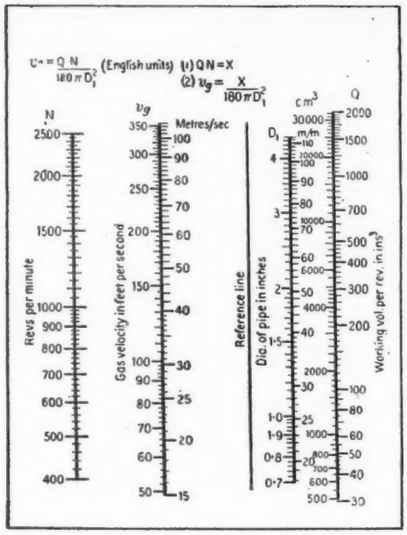
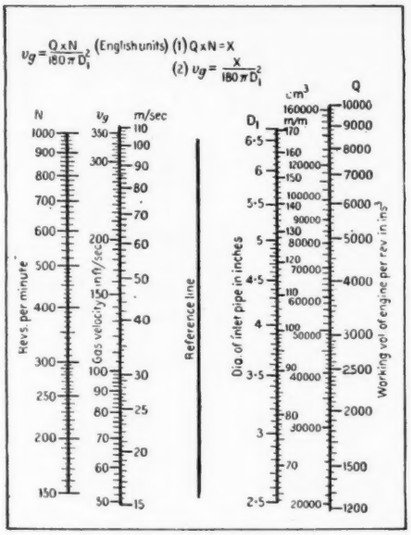
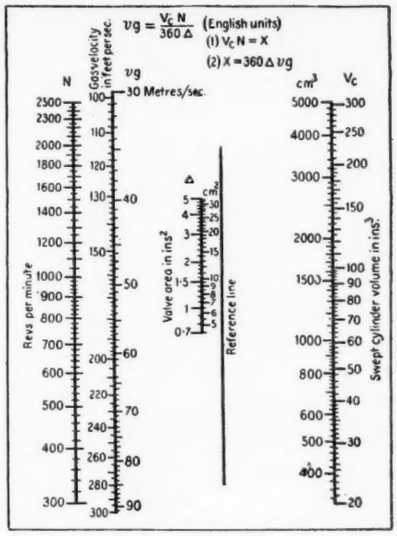

(1) $V_c = \frac{\pi}{4} D^2 S$
(2) $Q = V_c J$
D
m/m
Cylinder dia. in inches
Q
V_c cm³
Swept vol. per cylinder in ins.³
Working volume per rev
J
Number of impulses per rev
S
Stroke in inches
$HP = \frac{P_m \times Q \times N}{396000}$ (English units) (1) $Q \times N = X$ (2) $HP = \frac{X \times P_m}{396000}$
Working vol. of engine per rev. in ins.³
Horse power
Reference line
P_m
lb/ins.² Kg/cm²
Mean effective pressure (Gauge)
Revs per minute

Figs. 21, 22 *and* 22a







Figs. 23, 23*a and* 24

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English Mechanic: Oct. 13, 1916.
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Notation

As the notation used in this paper has been purposely changed from that employed in the books dealing with the theory of the subject, in order that the system shall not look at all complex, the following further notes on the three types of nomogram are added in which the usual notation is used.

In the works referred to in the paper the different variables appearing in the formulæ are denoted by z_1, z_2, z_3, etc., and a function of these variables is denoted by $f(z_1)$, $f(z_2)$, $f(z_3)$, and so on, but for the sake of brevity the notation f_1, f_2, f_3, etc., is written for the above.

To denote different functions of z_1, f_1, g_1, and h_1 are also used.

With this notation the formulæ would be changed as follows:

Type A.
Here the formula would be written

$$f_1 + f_2 + f_3 = 0 \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

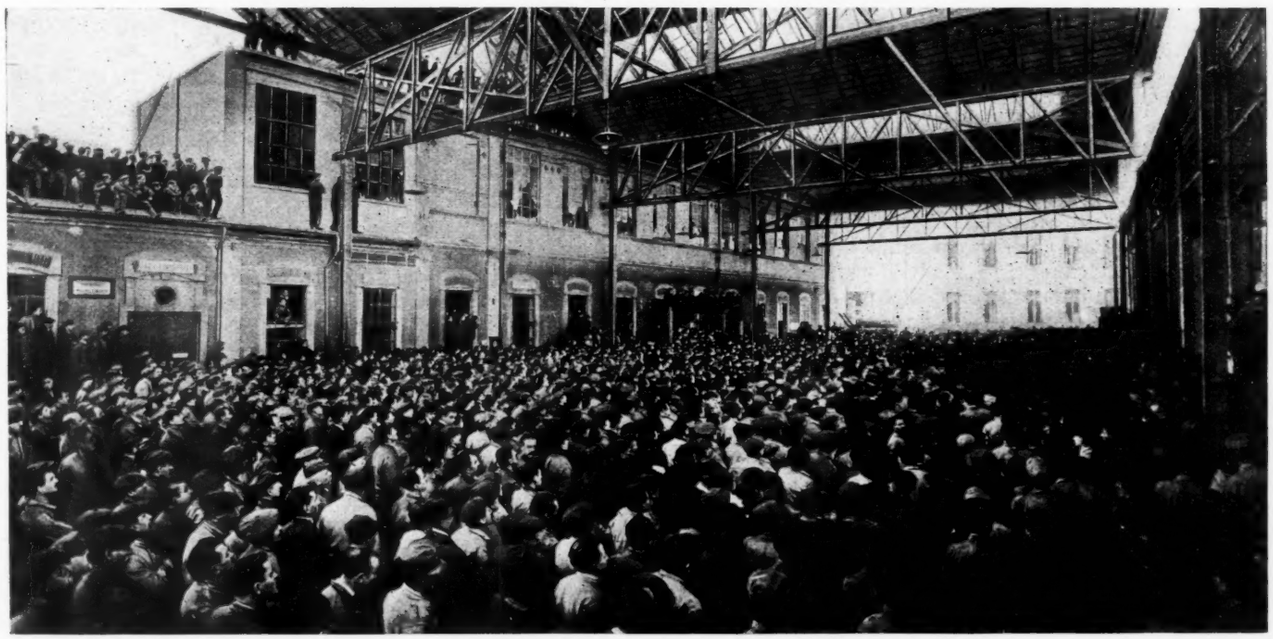
Type B.
Here the formula would be written

$$f_1 + f_2 f_3 = 0 \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Type C.
Here the formula would be written

$$f_1 g_3 + f_2 h_3 + f_3 = 0 \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

In this case g_3 and h_3, as well as f_3, are functions of z_3.



Thirty thousand employees have congregated to listen to speeches of wounded soldiers on the subject of "Allied War Aims"

Design of Automobile Glass Fronts

Part IV

Defects Found in Modern Glass Fronts—Windshield Cleaners—Tonneau Shields—Future Developments

By Karl Feilcke

DEFECT No. 6: The average glass front is dangerous.

As accidents are unavoidable it is the duty of the car designer not to increase the dangers to the passengers unnecessarily. Placing them directly behind an easily shattered glass, and exposing them to the risk of being cut by the glass fragments in case of an accident cannot be considered good practice. Statistics show that even in comparatively slight collisions severe injuries are received in this manner, especially by the extra front seat passenger, who cannot brace himself and is frequently thrown against the shield. It is therefore only a question of time until some kind of unbreakable glass is universally used in the windshields of better cars. Such glass is already on the market and consists usually of two thin glass plates with a sheet of celluloid between, which holds the fragments in place even if the glass plates are completely shattered.

Defect No. 7: The quiet zone even on an inclined shield does not reach far enough back, and the passengers are subjected to disagreeable back drafts.

These drafts are mostly air currents coming from the side (see Fig. 2) and are due to the fact that the shield is not inclined sideways. A remedy for this defect would be the use of a V-shaped glass front. It has already made its appearance on a few closed cars, and consists of two independent two-piece shields, slanting crosswise and sidewise and joining in the center of the car. It is possible that V-shaped shields will also be used on open cars in the future.

So far we have only referred to defects in detail construction, but even if all these are eliminated and the glass front is right in itself, its usefulness can be very much impaired if it is not placed in proper relation to the driver. It is in this respect that most mistakes are made. To illustrate this, actual conditions of a medium priced American car (1918 model) which is manufacured in large numbers are given in Fig. 26, for they are a typical example of present day glass front design.

It is easy to see that the conditions as shown in the above figure are not correct. The shield is evidently too low, for the passengers are not fully within the quiet zone, and the ventilating feature is impaired by putting the glass front so far ahead on the body that the lower glass has to be put at a considerable angle to force the air down into the front compartment. This means, of course, that the draft cannot be properly regulated and that it is either too strong or not there at all. The gap in the glass is also located too low, for to get clear vision position and overlook the road at the proper distance ahead of the car the upper glass has to be tilted up too high. This makes the gap extremely wide and causes cold air, wind, rain and snow to rush in, very much to the discomfort of the driver.

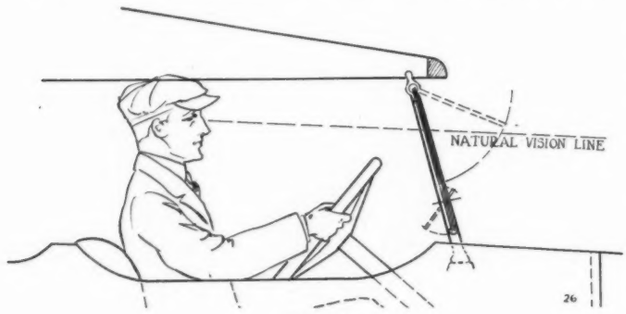


Fig. 26

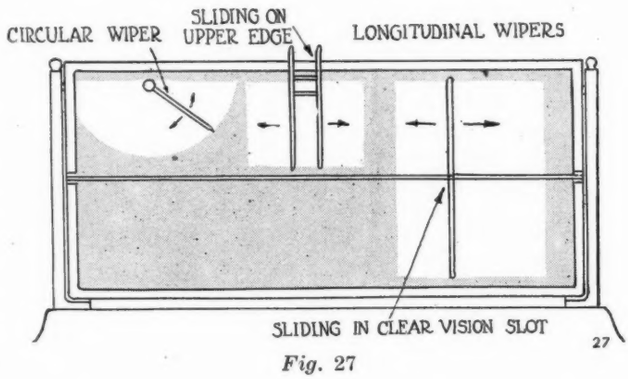


Fig. 27

Windshield Wipers

The inconveniences caused by the improper location of the shield with reference to the driver on most cars have been the cause of bringing on the market a number of devices which purport to overcome them. They usually aim to make the clear vision position unnecessary by providing for the wiping and cleaning of the glass plate. The devices brought out so far are (See Fig. 27):

(a) The circular wiper.

This wiper is inefficient because it does not clean the glass sufficiently to overlook the road sideways, which is absolutely necessary when driving around a corner, for instance, and in order to overlook the traffic in cross streets.

(b) The longitudinal wiper, which appears in two forms, sliding on the top edge and sliding in the slot. While both of these wipers clean the glass sufficiently to look sideways, they have other serious disadvantages. The former prevents a good airtight connection between the top and glass front, and the latter interferes with the moving of the lower plate into ventilating position.

All types of wipers have the common defect of being ineffective against ice or frozen snow, and at best have

only a limited usefulness. The proper way of overcoming the defects caused by faulty location of the shield is not to be found in additional accessories but in the correct installation of the glass front itself.

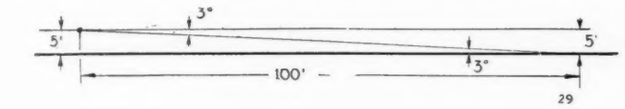
If we take the average sized person into consideration there is, of course, only one correct position for the glass plates in relation to the driver, which can be determined as soon as the following dimensions are fixed: the height of the seat, and the distance from the driver's eye and from the top of the driver's hat to the seat. The height of the seat varies considerably on different cars and models. In our example (see Fig. 28) we have chosen 14 in., when the seat is compressed by the weight of the driver, which is average touring car practice.

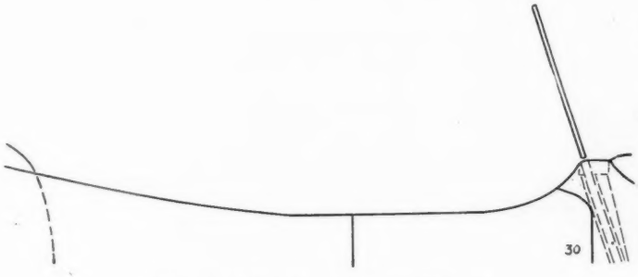
Windshield Dimensions

The distance from the driver's eyes to the seat for the average sized person is about 28 in. and the distance from the top of the driver's hat to the seat about 34 in. Experience shows that at least four inches head room have to be given to get comfortable conditions, which fixes the minimum height of the top directly over the driver's head at 52 inches from the floor, and in turn determines the height of the glass front. The latter affords, of course, the more protection to the driver the higher it is, and it is therefore good practice to let it protrude into the top as much as possible. As the top slants slightly downward in front the highest point of the glass front will be slightly lower than the lowest point of the top over the driver's head, that is, in our case, about 48 in. above the floor. We have seen before that it is advisable to bring the shield as close to the driver as possible, but here the steering wheel comes in as the limiting factor. The clearance between wheel rim and glass front should not be less than 3 in., with the lower glass in the most disadvantageous location (ventilating position), in order to let the driver's hand pass without interference when the wheel is turned. If we strike therefore a circle with a radius of 3 in. around the upper edge of the steering wheel and draw a tangent to this circle at the angle chosen for the slant of the shield, we have fixed the best position for the shield. The next step is now to determine where to divide the glass. In order to be safe a driver must be able to overlook the road at least 100 ft. ahead. If we take the average height of the driver's eye from the ground to be 60 in. we can figure the angle at which he looks from the formulæ

$$\tan a = 100 \div 5 = 0.05$$
$$a = 3 \text{ degrees}$$

In other words, the natural way to look is along a line drawn at an angle of 3 degrees below the horizontal





Upper—Fig. 29. Lower—Fig. 30

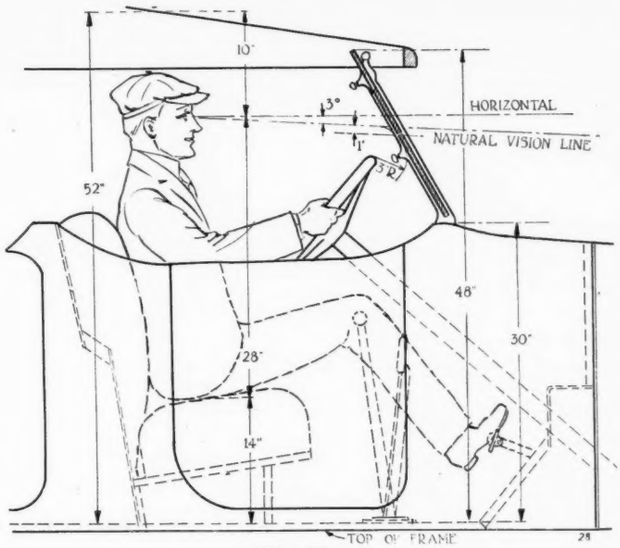


Fig. 28

through the driver's eyes (see Fig. 29). Theoretically, therefore, the glass should be divided on this vision line. Experience, however, shows that it is more advisable to divide the glass front about 1 in. below that line.

The clear vision position is used only at times, and placing the gap slightly below the normal line of vision makes it possible for the driver to look most of the time through the upper glass instead of having the ground edges of the two glasses in the vision line. It forces him, of course, to stoop down slightly if he wants to look through the gap, but this is not objectionable considering the advantage gained for normal conditions. A division somewhat below the theoretically correct point has also the advantage of making it possible for smaller people, women, boys and girls, to use the glass front properly. This consideration, however, does not justify the extreme low position of the clear vision slot on many cars.

Having located now the dividing line, all that remains is to fix the lower edge of the glass front. In this respect we have considerably more leeway, as the only condition we have to comply with is to make the lower glass large enough for ventilating purposes. Experience shows that the best conditions are obtained by making the lower glass as wide as the upper one, that is about 6 to 8 in. This brings the lower edge of the glass front 30 in. above the floor of the front compartment in our case.

Tonneau Shields

The fact that the cowl shield does not afford sufficient protection to the passengers on the rear seat of an open car has led to the introduction of the tonneau shield of late. As the latter is only used in fair weather, when the top is down as a protection against cold air, wind and dust, the ventilating and clear vision positions are not needed, and all tonneau shields brought out so far are plain single piece shields which can be put in the upright position only. There are three main types of tonneau shields in use, the sliding, swinging and folding type.

The sliding shield consists of a single glass plate attached to the back of the front seat and hidden in a pocket of the latter when not in use (see Fig. 30). It affords ample protection to the occupants of the auxiliary seats on the average six or seven passenger touring car, but is usually too far away from the passengers on the rear seat to be of any benefit to them, and its effective use is therefore limited to very short coupled four or five passenger cars.

The swinging type of tonneau shield is at present the most popular on large six or seven passenger cars. It is usually equipped with side flaps, gives ample protection to the rear seat passengers and makes the use of the auxiliary seats possible when folded. Owing to the insufficient support by the long folding arms, it is often shaky and exerts a considerable strain on the body.

This defect could be overcome by proper construction, as it is mostly due to the fact that the shields are not installed by the car manufacturer but added later on as a makeshift by the dealer or owner.

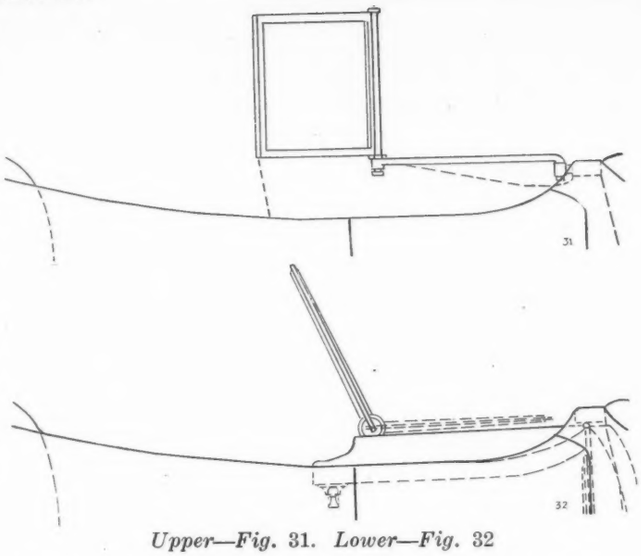
The folding type, as shown in Fig. 32, offers probably the best solution of the problem. The shield is here attached to a deck, which swings on hinges at the back of the front seats and either hangs in a recess of the front seats or is folded up and supported solidly in such a manner that it covers up the tonneau from side to side. The deck acts thus as a second cowl and the shield itself is brought so close to the rear seat passengers that it affords ample protection to the latter.

All that remains to be done now to complete the task we have undertaken is to enumerate the shortcomings common to all glass fronts, even when properly designed and installed, which have to be overcome to make further progress and define in that manner the lines along which all future development in glass front design has to take place.

These general defects are:

1. That joints and journals are used, which are supposed to be absolutely rigid when tightened and easily moved when loosened. These opposing demands are difficult to realize, and in practice joints do not exist which come up to these requirements for a long period. The journals are exposed to all weather conditions, heat, rain, snow and dust, and if left for any length of time in a certain position usually become so tight that it requires quite an effort to change the position of a glass front. In many instances the use of tools and the efforts of two persons are necessary to make a change in the glass front position.

2. That it is in many cases necessary to stop the car and leave the seat to change the position of the glass plates. This is the most serious defect, for often a quick change is desired, especially in order to get a clear-vision position.



Upper—Fig. 31. Lower—Fig. 32

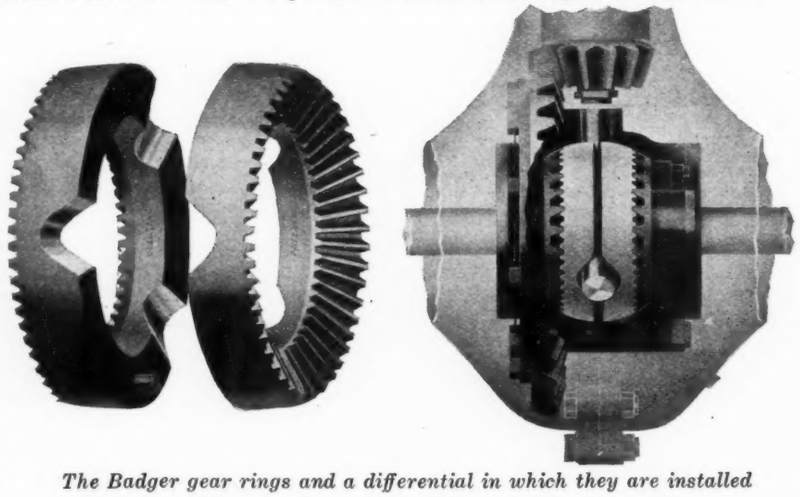
Any future development must be concerned with the elimination of these defects, and a survey of the patent situation indicates that the minds of many designers are already concerned with the matter. The importance of a progressive development in windshield design cannot be over-estimated, for the fate of the open car depends upon it. There are many people who believe that the open car will ultimately be displaced by the closed car, because it does not provide enough comfort during the cold season, but a real advance in glass front design, together with improvements in top and side curtain arrangements, may overcome this objection and give the open car with its light weight, low cost and better performance a new lease of life. For reasons of efficiency and economy the latter would be a very desirable thing and of the greatest importance to the automobile industry.

Badger "Two-Wheel-Drive" Differential

THE Lewis Differential Co. of Milwaukee is beginning the manufacture of the Badger "two-wheel-drive" differential. This differential is of the type designed to obviate spinning and loss of traction when one wheel is on slippery ground. It is also claimed to prevent skidding. A differential for the Ford car will be produced first, and sizes suitable for other cars as fast as manufacturing facilities will permit. Six sizes are expected to take care of all requirements.

A special feature claimed for the Badger differential is that it is much simpler to install than similar devices that have been placed upon the market previously. To install it in the Ford car, for instance, requires only the taking out of the three differential pinions and putting in the two Badger gears, using the same spider. It is claimed that a Ford owner can do the work with his regular set of Ford tools, and that a garageman can make the installation in two to three hours.

The principle of operation may be understood by reference to the illustration. It will be seen that the Badger gear set consists of two gear rings which are placed back to back, each of which has three slots of peculiar form cut in its back edge. The walls of these slots serve as face cam surfaces, engaging with the driving pins of the differential. The inclination of the cam surfaces is such that motion can be transmitted through them in one direction only. In turning corners, of course, all of the power is transmitted through the inside wheel.



The Badger gear rings and a differential in which they are installed

International Aircraft Standards

By Coker F. Clarkson

General Manager of the Society of Automotive Engineers

THE American Aircraft Commission which spent several weeks in Europe recently in conference with engineering representatives of the Allies, on the formulation of harmonious specifications of materials and mounting and other dimensions of parts for aircraft, was constituted of three representatives from the Society of the Automotive Engineers, three from the International Aircraft Standards Board, two from the United States Signal Corps, and one each from the National Advisory Committee for Aeronautics, the Bureau of Standards, the United States Navy, the American Society of Mechanical Engineers and the American Society for Testing Materials. The request that the various societies appoint delegates having been acted upon, the whole matter was referred to the Government and the personnel of the Commission decided upon after consultation with representatives of Governmental, manufacturing and engineering organizations.

The British Air Board (now the Air Council) had, in conjunction with the British Engineering Standards Committee (now the British Engineering Standards Association), formed a Sectional Committee to deal with the standardization of the components of aircraft and aircraft engines, and nominated several sub-committees to consider the details of the different branches of the subject. The British organization had been in communication with the French and Italian standardization committees.

Delegates Had Advisory Powers

The belief that the conferences would constitute a real advance and facilitate ultimate international standardization was borne out. The delegates had advisory powers only, the arrangement being that after conferring they would make recommendations to the authorities by whom they were appointed.

The members of the American Commission attended scores of sessions and conferences with their European brethren. Many aircraft and engine manufacturing plants were visited. Government factories, repair stations, laboratories and salvage depots were inspected and their methods studied.

A formal International Conference was held in London, representatives of France, Italy, Great Britain and the United States being present. The general subject of co-operation of the Allied Powers, through exchange of ideas and standardization of aircraft materials, was discussed. All were in favor of a permanent aircraft standards organization representing at least five of the Allied Nations.

Branches of Service Represented

The following branches of the service and organizations of our Allies were represented in the conferences:

British—Technical Department of Aircraft Production and Aeronautical Supplies of the Ministry of Munitions, the Admiralty, the National Physical Laboratory, the Aeronautical Society of Great Britain, the Society of British Aircraft Constructors, the Aircraft Steelmakers' Committee, the Technical Committee of Motor Industries, Aeronautical Inspection Directorate, Brass and Copper Tube Association, British Electrical and Allied Manufacturers' Association, British Ignition Apparatus Association, Cable Makers' Association, ball-bearing manufacturers, the Weldless Tube Association, the Irish Power Loom Manufacturers' Association, the Iron and Steel Institute, and the Steel Research Committee.

French—Section Technique de l'Aeronautique and Service de l'Aviation.

Italian—Mission pour l'Aeronautique Militaire Italienne a l'Etranger, and Services d'Approvisionement de l'Aviation Italienne.

The prime objects of the conferences were to facilitate the sending of most usable supplies to England, France and Italy from the United States and to settle mutually satisfactory standards and specifications; to make parts, fittings and instruments interchangeable on aircraft produced in the different countries.

Great Strides Made Abroad

England and France and Italy, during the past three years, have worked with an energy never before equaled and have made tremendous strides in aircraft design and production. The members of the American Commission were highly encouraged by what they saw. The spirit of co-operation in which they were met, the wholehearted expression of desire to work jointly to achieve the largest result toward the one thing worth considering to-day were most gratifying.

The production of our Allies is now large. The work of their technical and scientific men in aircraft lines has been carried on in a very extensive and effective way.

Specifications for Steels: Progress was made at the conferences abroad in the formulation of Allied standard specifications for aircraft steels, using the current American, British, French and Italian specifications as a basis; covering both the general procedure for testing and the chemical and physical requirements of wrought steels.

Fabrics and Dopes

Fabrics: The American standard fabrics have been submitted for test and specifications have been recommended.

Dopes: The British specifications and methods of inspection were studied carefully. The science and economics of the manufacture of these articles are, of course, important.

Radial Bearings: In the metric sizes the S. A. E. and the British ball-bearing series are identical, except that six S. A. E. sizes have not been included in the British list. A revision of tolerances and limits recommended by the British and the American delegates is under consideration. Limits of eccentricity in radial bearings and outside dimensions of thrust bearings were other subjects of study.

Spark Plugs: The 18-mm. spark plug, incorporating the best features of the British and the S. A. E. plugs, has been recommended for use on American and British

stationary cylinder and rotary engines. Practically the same plugs are used in France and Italy.

Magnetos: The dimension specifications for British and for American magnetos are substantially the same, with the exception of one dimension of magneto space. The American specification of the taper as one in five is the same as the British specification of the taper as one in ten, owing to the fact that the British refer to the slope of the conical surface to the axis.

Nomenclature: Representatives of the National Advisory Committee for Aeronautics and of the Society of Automotive Engineers are conferring with the committee of the Aeronautical Society of Great Britain on nomenclature.

Instruments: It is necessary to standardize further the connections and attachments and also the general character of the indication of instruments.

International Unification of Units of Measurements

The plan, provisionally adopted by the subcommittee of the International Commisison on Pipe Threads, which met in Paris, July, 1914, for a standard method of designating units of construction, was discussed, with reference particularly to screw threads and gear-wheel teeth, the idea being to seek a unit which could be used when either the inch or the metric system is employed.

Taking screw threads as an illustration, a system of notation was outlined by which each screw would bear a distinctive number based on the diameter in eighths of an inch, and the pitch in the number of threads per inch or per 127 mm. (which equal 5 in.) without reference to the unit in which the measurement might be made. For example, a $\frac{3}{4}$-in. U. S. standard bolt having 10 threads per inch would be designated a "6 x 50" bolt in countries using the metric system.

The selection 127 mm. as the length over which the number of threads should be stated in countries using the metric system is based on the fact that this gives whole number of turns, these being five times the number of threads per inch.

The very difficult problem of bringing together the advocates of the metric and of the inch bases is in abeyance, but it is felt by some that the plan outlined above may afford the first step.

Many Problems Discussed

Plywood and Cements: The British specifications for plywood and for casein cement were discussed in detail.

Glue: The practices in the preparation and use of glue are much the same in the United States and Great Britain. Mechanical methods of application and electrical methods of heating are used largely here, but neither of these methods is common in England. Comparative tests of British and American methods of testing glue are being made.

Timber: The question of spruce supply was naturally discussed. Kiln procedure has been simplified, the results being satisfactory almost invariably. It is appreciated by all that the splicing of wood is an important subject. Additional approved signs of laminated and box spars will be recommended.

Structural Tubing: The possibilities of further development in the methods of drawing and heat treating tubing are being studied with promise of marked improvement.

Lubricating Oil and Gasoline: The gasoline and lubricating oil questions require continued attention, to assure adequate supplies of proper quality. Compounded oils will be furnished where required, as well as grades of gasoline of proper homogeneity and low end-point.

Propeller Hubs and Fittings: Propeller hub and fittings practice will be further unified so far as shall prove advisable and possible.

Water and Fuel Piping: Co-ordination of water and fuel piping standards is largely dependent on thread practice. The use of outside dimension only for nominal diameters of metal tubing has been recommended by the British and the American Committees.

Electrical Apparatus: The practice in electrical apparatus peculiar to aircraft, such as signal lights, radio, generators, batteries, heating and protective devices, is under consideration in view of more extensisve use.

Wheels and Tires: The British and American practice in wheels and tires are substantially in accord. Discussion is being had as to the advisability of extending the list of wheel sizes which has been adopted here. The number of tire sizes will be kept to the lowest possible minimum.

Steel Wire Cables: The British and the American steel wire cables are sufficiently alike to be practically interchangeable. The same thing is true of high-tension steel wire.

Turnbuckles: It is felt that similarity of design is not necessary in turnbuckles, satisfactory interchangeability being securable if the fork-end and pin dimensions are standardized.

Gasoline Rubber Tubing: Comparative tests are being made of gasoline rubber tubing made to British and to United States specifications.

Installation of Apparatus: Standardization will be effected so far as possible in the location, mounting, size and indication of direction and method of operation of instruments and apparatus.

Adopt European Standards

The Work in Hand.—The single aim in considering the various matters is to ascertain to what extent we can, without interfering with our productive capacity, adopt European standards with advantages; to what extent we can assist more effectively in cases of European conformity with our practices; following the course that will bring the best results. That which does not contribute to the winning of the war is of quite secondary importance. Anything that does contribute to the winning of the war is obviously of prime importance.

As was pointed out by Mr. Winston Churchill, British Minister of Munitions, at the Inter-Allied Aircraft Conference, the detailed standardization of aircraft materials among the Allied Powers now fighting the Germans is based on principles so obvious that they really do not require emphasis; the principles of a common front, of the freest possible communication, a lateral communication between all parts of the front, of common reserves, upon which all can draw at any moment, of interchangeability of troops and of materials of all kinds at any moment—these are clearly steps which enable us, although we consist of many nations, fighting for a common cause, to realize day by day and week by week the continuous approach toward complete unity of action and all the efficiency and integrity of action which comes from a simple purpose and a single system.

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WE have received from the U. P. C. Book Co., Inc., 243 West Thirty-ninth Street, New York, copies of recently issued catalogs on standard books on the metallurgy of iron, steel, brass, mechanical engineering and other subjects.

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A COPY of the report of the 1916-1917 Committee on automobile headlamps of the Illuminating Engineering Society, 29 West Thirty-ninth Street, New York, has been received. In this report the subject of headlamp illumination is discussed from a scientific standpoint.

Problems of Gear Standardization

Gear Makers and Gear Users Should Exchange Results of Their Practical Experience

By Charles F. Feltz

IN the April 25 issue of AUTOMOTIVE INDUSTRIES there is set forth the purpose of the American Gear Manufacturers' Association to develop standards for use in the design and manufacture of gearings. Such standardization presents great opportunities for both good and evil. From the viewpoint of the manufacturer good only can result, but there may be danger to those whose interests lie in the search for increased mechanical efficiency or the development of new and improved methods of transmitting power.

It should not be the purpose of the A. G. M. A. to attain their end by adopting as standards certain present types, sizes and methods of design and present methods of manufacture and then to so favor those standards as to discourage the use of others.

Greater ease of manufacture and increased production will result from the adoption of standards which limit as much as possible the changes in types and sizes of gearing, but this would tend to discourage improvement in gear design, and, therefore, the gear user as well as the gear maker has a vital interest in the development of any standards for either the design or manufacture of gearing.

In the report of the A. G. M. A. meeting at White Sulphur Springs the statement is made that insufficient scientific data exist for the design of gearing. This is so, but it is even more true that there has been too little effort among gear users and makers to exchange and formulate the results of their practical experience. Present-day gear efficiencies have been obtained at a great and totally unnecessary expense mainly because of the difficulty of one designer in securing the results of another's experience. This has resulted in countless duplication of similar and costly experiments.

Present-day gear efficiencies are wonderful in view of the haphazard "cut-and-try" methods by which they have been evolved, but there still exists much room for improvement. This may come either through study of the gearing itself or through improvement in the conditions and requirements which the gearing must meet.

Possibilities in Gear Improvement

Improvement is possible in the gearing itself either in the manufacture or the design. The latter may be effected by many means. New materials will be produced. The present ones will be improved. Hardening and heat treating will increase wearing qualities and strength. These changes will in turn permit changes in gear ratios and this again will require new standards.

To illustrate the possibility of improvement in the requirements which gearing must meet, consider automobile gearing, which now, particularly under heavy truck service, must be designed with two main points in view—horsepower to be transmitted and allowance for shocks. Undoubtedly in determining the size of the teeth, the bearing surface, the quality of metal, etc., shock is the governing factor.

Sooner or later there will be evolved new types of axles which will eliminate shock between engine and driving wheels. Because they have so far existed it does not follow that these shocks will always be present as a factor in design. For example, in trucks the shocks thrown on axle, gearing and engine by the practice of coasting down hill and then at high truck speed throwing in the clutch with the engine at low speed, can theoretically be eliminated by an overrunning clutch, and some designer eventually—and, it is to be hoped, soon—will make it a practical possibility. The load will come on the gearing only when the engine and other moving parts are in synchronism. Then the gears can be designed with more heed to wearing qualities and efficiency and present-day standards will no longer be in vogue. Many other of the present difficult requirements on gearing will similarly be removed.

Concrete Figures Wanted

It is astounding in these days to hear authorities point out the haze which surrounds gear design. Granted that in 1879 there existed 48 well-established rules for horsepower and working strength, some of which differed 500 per cent. But in 1879 there were not available our present methods of scientific study nor the instruments now at hand and there is no excuse for the existing lack of accurate designing data except the unwillingness of those most interested to provide the means for securing what is needed.

We read that burnishing improves worm gearing, heat treating increases the wearing qualities, the spiral angle affects the efficiency. Why can we not put the degrees of improvement into figures of increased percentages of efficiency? What per cent is gained by burnishing and what by heat treating to meet a certain standard? These and all of the hazy design factors can be reduced to concrete figures through proper study, and the data once obtained, gearing of any type can be designed with as much exactitude as the structural parts of a building.

There should be standardization of gearing, but not solely from the maker's viewpoint. It should also be a standardization of the theories of design and of the stresses which are permissible, and this should be obtained by careful scientific study. There is no excuse for guesswork in the size of teeth, the correct spiral angle of worm gearings, the proper method or dimensions to be used for given conditions. These depend on factors which are determinable with a great degree of accuracy, but not by cut-and-try methods. Neither will they be secured in the preparing of standards by those whose natural aim is ease of manufacture and increased production.

This is work for the gear user. He should urge improvement of the requirements which gearing must meet. His interest is in one phase opposed to that of the maker. He should provide the means and arrange for proper investigation and thus co-operate with the standardization committee of the A. G. M. A.

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Coal Gas Motor Fuel

ONE of the most interesting sights to wartime visitors from the United States to England is the motor vehicles of all kinds fitted with collapsible gas bags and adapted for the use of coal gas in their engines. The plan was first applied to commercial vehicles, such as motor buses, but has been extended until now even motorcycles may be seen fitted with a gas bag on the side car. Owing to the scarcity of shipping, more and more restrictions were placed upon the use of liquid fuel for private purposes, and finally it was forbidden altogether. This left owners of motor vehicles urgently needing the service of these vehicles no other choice than to fit them for the use of coal gas.

However, the transformation of thousands of vehicles and the manufacture of the gas bags for them also was a serious matter in a country whose entire industrial resources are devoted to the prosecution of a big war. If it had not been for the scarcity of steel and of labor in the steel trades, steel bottles for carrying the gas under very high pressure would undoubtedly have been used in place of the collapsible containers, but under existing conditions this plan was not to be thought of. In fact, restrictions were placed also on the sale of the bags and it is not possible to obtain them without a special permit.

It was realized, however, that transport is essential for "carrying on," and the important question is how the transport can be obtained most economically. The British Government therefore appointed a committee to look into the subject of "gas traction," as it is called abroad, and this committee has just made an interim report which is most favorable to the new motor fuel. With gas of ordinary quality at 4 shillings per 1000 cu. ft., the cost of the fuel is equivalent to gasoline at 20 cents per U. S. gallon. It is recommended by the committee that no restrictions be placed on the use of coal gas on motor vehicles other than those based on shortage of coal or other war conditions.

Evidently the committee has gone quite thoroughly into the difficulties encountered with the use of gas as well as into its advantages, for a number of recommendations are made intended to improve the service. It is said to be not necessary to change the compression space of gasoline engines. A standard design of filling coupling is recommended, together with the use of a tray at least 18 in. deep for the flexible containers, well ventilated garages and containers of a material which does not readily become pervious to the gas.

The report no doubt will greatly encourage those who have occasion to make serious use of their vehicles, but have been prevented from doing so by lack of fuel. It will also most likely lead to important advances in the design of gas containers.

International Standardization

UNDOUBTEDLY the greatest obstacle to international standardization at the present time is the use of two different units of length, the inch and the centimeter. There is no difficulty of expressing any given length in terms of either the metric or the English unit, but it is naturally preferred to have constantly recurring dimensions, such as pipe and bolt diameters, expressible in simple figures, as, for instance, eighths of an inch, and this cannot be done in both systems if the sizes are the same. To give the equivalent of an inch measurement in round figures in the metric system with any degree of accuracy requires at least three figures, and this involves undesirable complications.

A plan to alleviate this difficulty was worked out by the International Commission on Pipe Threads which met in Paris in July, 1914, and was explained by Mr. Clarkson of the S. A. E. in his report of the trip of the American Aircraft Commission abroad. The idea is to use a system of notation which will go equally well with both the metric and the inch system of units. For screw threads, for instance, two numbers would be used, one designating the diameter and the other the pitch of the thread. It is, of course, very desirable that all figures should be integers and as small as possible, so it was decided to designate the diameter by the number of eighths

of an inch and the pitch by the number of threads in a length of 5 inches, or 127 millimeters. This gives a system of terms similar to that now used for machine screws. For instance, a U. S. standard ¾-in. screw having 10 threads per inch would be known as 6-50 screw.

The system is well adapted to pipe threads, the diameters of which progress in steps of ⅛ in., so that all numbers are integers, but for machine screws, which run in sixteenths of an inch, it would seem much preferable to make 1/16 in. the basic dimension.

The above plan will tend to eliminate the need of reference to the inch system in metric countries when dealing with standards based upon the inch system, such as the pipe thread standard, the U. S. screw thread standard, etc. In this way these standards could be absorbed into the metric system, though they would not be what would be adopted if new standards were contemplated in a metric country. It may be a step toward universal standards, but it is certainly only a very small step, as a universal system of measures is essential to really universal standards.

Need for Highways Now Recognized

THE complete reversal of the government program with regard to transporting stone, sand, gravel and other road materials in open-top freight cars is one of the best indications that has come from Washington in several months that the government departments are recognizing the necessity of a well-maintained system of highways under war conditions.

The present ruling of the Railroad War Board, permitting coal, coke and ore cars on return loads to carry road-building material, will not only reinvigorate the road-building program, but should result in perhaps 40 per cent of the demand for road materials being satisfied. This return-load service will not greatly interfere with the transportation of coal, coke and ore. This fact was established by the experience of the Fuel Administration last winter when it stopped the use of coal cars on return loads for transporting automobiles. The Fuel Administration admitted that there was very little gained by this policy.

This first intimation from Washington of a reconsideration of its attitude toward road-building last fall augurs well for a more vigorous road-building program in the near future. The necessity of driving war trucks overland from factory to seaport; the establishment of return-load bureaus; the necessity for long-distance inter-city haulage; the necessity for rural express systems, and the necessity for using motor trucks for clearing railroad terminals has undoubtedly convinced the government that the railroads must be supplemented by a comprehensive motor truck system in order that transportation may be adequately cared for.

To-day the railroads have not the capacity to care for our national transportation, and if they had such capacity and had possessed it during the past year there would be no necessity for a shortage of steel, a shortage of coal, or the curtailment of industries, which has been so damaging during the past year.

The railroad system must be augmented by a motor truck system embracing as it should ramifications to meet all requirements. What is needed to-day are more locomotives, more railroad cars and more motor trucks. With the increased transportation so obtained it would be possible to soon reach a peak of steel production where there would not only be enough steel for all government requirements but for industries as well.

If the government through its War Industries Board would provide a budget showing its requirements of various kinds of steel for the coming year so that the steel manufacturers could make a definite survey of the field and set their plans for a continuous drive on steel production, great stability and added confidence would be given to many industries that have had an unfortunately vacillating experience during the last 10 months. The attitude of the government on road materials suggests that the different departments are obtaining a more correct view of what products are vitally necessary to-day.

What a contrast there is in classifying road materials along with coal, coke, and ore, although in a secondary degree, with the attitude of last fall when these materials were classed with talking machines, material for moving pictures, and furniture. The entire country should be encouraged at this new chapter in highway maintenance.

Needed—A Steel Budget

THE demands of the steel industry upon the War Industries Board for a budget of its steel requirements for the next year is a business request that should be heeded by that organization. It may not have been the custom of certain organizations to work on the budget principle in the days when the government was largely political, but these are war days when war largely means industry, and the government should act on a business basis.

Steel manufacturers are assured that if they can have a comprehensive budget of government steel requirements they can then plan their activities and furnish not only enough steel for the government, but for the industries as well. Up to this time the War Industries Board has not been forthcoming with such a budget, and until it does there can be no intelligent curtailing of any industry. It is only when government needs are definitely known that steel producers know how much steel remains to be divided among the industries.

□ Latest News of the

Factory Capacity Is Sufficient

David Beecroft Tells M.A.M.A. Convention That Ocean Tonnage Is Only Shortage

NEW YORK, May 28—The question of munition contracts for the automotive industries is uncertain, and it looks as if few additional contracts for some time can be expected. The capacity of our factories producing munitions is approximately five times the requirements. There are few more munition contracts for our industries, and undoubtedly those concerns that got the early contracts will receive the repeat orders. The shortage of ocean tonnage is the neck of the bottle. It was this shortage that resulted in cutting down our war truck orders to the extent of 37,000 trucks some 2 months ago. At present many industries are in Washington every month seeking war orders which are not forthcoming. Some of the industries which are in a position to handle war contracts, are the following:

The malleable iron industry, which has been supplying the automobile industry, should handle a large amount of work.

The dairy farm equipment industry has much spare capacity.

The carriage industry has unlimited capacity for building bodies for motor trucks.

The piano industry has been slow since the first of the year and has capacity for airplane work, such as building parts for the wings.

The automobile body industry has spare capacity which should be suitable for truck body work.

Other industries with available capacity for war contracts are the automatic screw machine and metal furniture industries.

These facts were given out last week at the Atlantic City Convention of the Credit Managers of the Motor and Accessory Manufacturers Assn. by David Beecroft. Mr. Beecroft drew attention to the present unsatisfactory conditions of the inventories of raw materials and manufactured parts in many of our factories. While the average steel inventory may constitute a 90-day supply there is scarcely a factory that is not short on some kind of steel, and this shortage is cutting down daily production. Last week one large automobile factory was practically out of fender steel and its output was cut temporarily 60 per cent. These are days when not only automobile makers but truck makers should balance their inventories.

The steel mills would be able to give the factories more steel if they knew the government requirements. The War Industries Board, although asked to, has not yet furnished a budget of steel requirements of the government. Until such a budget is furnished the steel makers are not able to work to their greatest capacity. There are certain parts of steel mills not adapted to work on ship-building plates, and other government requirements. They are suitable, however, for the production of automobile steels, and if the War Industries Board would furnish a steel budget and give the steel makers a free hand to go ahead and furnish this steel there is no question but that there would be enough steel for all government requirements and also for the industries. The capacity of steel mills has increased 100 per cent since the start of the war. These mills are now operating at 80 to 85 per cent capacity but many manufacturers in the automotive field are obtaining less than 60 per cent of the steel received a year ago. This is partly due to the fact that in January and February some of the steel mills were operating at as low as 50 per cent capacity, due to a shortage of coal and coke.

In speaking on the subject of conditions that may be expected to affect the automobile industry, Mr. Beecroft further referred to the reported shortage of different metals such as chromium, vanadium, tungsten and manganese. He said there is enough raw chromium in California to serve us for years, but at present certain interests are endeavoring to control it and the California supply is being held back. Brazil has ample quantities of manganese but we must have ships to transport it. Colorado can furnish all of the vanadium required. With this situation as regards the necessary metals for steel production, the steel situation comes back to the question of the War Industries Board providing the budget which will show the government needs.

Labor, according to Mr. Beecroft, is a factor that is affecting the automobile industry. Although wages have increased 50 per cent in the last year in many factories the efficiency of the individual worker has been reduced 10 per cent. There are some factories, in fact large chains of factories, in which the monthly labor turnover is 45 per cent. In some of these factories the percentage of absentees is as high as 15. These figures have proven that increase in wages is not the open sesame to increased production. Something else must be done. Some laborers are earning so much money that they have openly stated they must take time off to spend it.

The shortage of skilled workers is a

(*Continued on page* 1061)

Girl's Resignation Accepted

Director of Production of Motor Transport Section to Rejoin Standard Parts

WASHINGTON, May 28—Acceptance of the resignation of Christian Girl, director of production of the Motor Transport Section, was made Saturday, May 25. Mr. Girl, who has been trying to obtain an acceptance of his resignation for several weeks will leave Washington tomorrow to return to Cleveland and assume his duties as president of the Standard Parts Co. Mr. Girl filed his resignation last January when he foresaw that his work would be completed by May 1.

The work of Mr. Girl in Washington dates from last fall when he was asked to take charge of production of the standardized truck program. His work was that of organizing a complete force to secure the prompt start on the program of manufacturing the parts entering into the trucks as well as assembling the completed vehicles. Mr. Girl in his Washington activities refused to have anything to do with placing the orders for the parts or the assembly of the vehicles but his general plan was to spread these orders over as wide a range of parts manufacturers as possible.

Mr. Girl has been one of the most outspoken representatives of the automobile industry which has taken up Washington activities, and while he has been working directly for Secretary of War Newton D. Baker, he has always remained unfettered in regard to free speech as to the conduct of the war, and the program relating thereto. He has been one of the strongest exponents of the standardization program not only on motor truck matters but in all war apparatus. Last October, when the shortage of chromium threatened the shipment of automobile steel to the manufacturers, Mr. Girl was the first in the industry to reach the conclusion that there was not the shortage of steel which was reported.

His great war doctrine has been that of increased production. His creed with regard to the war is more transportation. Build more railroad locomotives, more railroad cars, and more motor trucks to care for the transportation of the nation and then you will get enough coal to keep the steel mills going he says. He is a firm believer that with such a program there would soon come a supply of steel that would be adequate for the government needs, and leave sufficient for the industry.

Automotive Industries

Open-Top Cars for Road Material

Railroad War Board Rules That Sand, Gravel, etc., May Be Transported In Them

WASHINGTON, May 27—The Railroad War Board has ruled that open-top freight cars may be used for the transportation of sand, gravel and other road material, thus acting in line with the policy adopted by the United States Chamber of Commerce at its annual meeting in April.

The ruling, which has been prepared by the Car Service Section of the railroad board provides that available open-top cars not suitable for the transportation of coal, coke or ore, may be furnished for the transportation of stone, sand and gravel when so furnished shall be used preferentially for the transportation of highway maintenance material. It is further ruled that cars used for coal, coke and ore may be used for the transportation of road materials on their return trips to the mines, and that every endeavor should be made to furnish shippers of stone, sand and gravel with a minimum of 40 per cent of their normal weekly transportation requirements. The complete order follows:

1. Open top cars, suitable for such traffic, should be furnished preferentially for the transportation of coal, coke and ore.

2. Available open top cars, not suitable for the transportation of coal, coke or ore, may be furnished for the transportation of stone, sand and gravel, and when so furnished shall be used preferentially for highway maintenance materials.

3. Open top cars, suitable for the transportation of coal, coke and ore, and available on coal, coke or ore-producing roads in excess of the demand of such commodities, may be furnished for the transportation of stone, sand and gravel, and when so furnished shall be used preferentially for highway maintenance materials. The return movement to mines or ovens should be utilized wherever practicable in furnishing car supply for stone, sand and gravel. Every endeavor should be made, consistent with keeping up the production of coal, coke and ore, to furnish shippers of stone, sand and gravel with a minimum of 40 per cent of their normal weekly transportation requirements.

4. Roads which are not producers of coal, coke or ore must not use foreign open top equipment for stone, sand or gravel shipments, except for one load in the course of the return movement to mines or ovens.

5. Where the transportation needs of essential road construction or maintenance projects cannot be met by car supply furnished in accordance with the above rules, the State, County or Municipal officials in charge of the work should, through their proper State Highway Department, apply to the Director of the Bureau of Public Roads, United States Department of Agriculture, Washington, D. C., for assistance. Such applications will be considered by representatives of the Department of Agriculture, the War Department, the War Industries Board, the Fuel Administration and the Railroad Administration, and in accordance with the recommendations of such representatives, the Car Service Section will endeavor to furnish car supply necessary for approved essential road construction or maintenance.

It must be understood that car supply for stone, sand and gravel must not be permitted to jeopardize the essential production o coal, coke or ore. If at any time such a result is apparent on individual roads, or generally, orders will immediately issue to curtail the car supply for stone, sand and gravel.

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Moline Develops New 4-Cylinder Tractor

MOLINE, ILL., May 26—The Moline Plow Co. of this city has just announced a new model of its Moline Universal tractor, known as Model D. It differs from the previous model chiefly in being equipped with a 4-cylinder engine instead of the former 2-cylinder. The well known Moline 2-wheel principle is retained. The engine is of the valve-in-head type and delivers 18 hp. for belt work. Clutch, transmission, differential and final drive are completely enclosed and operate in an oil bath. There are 12 Hyatt roller bearings in the transmission and drive. The tractor complete weighs 3380 lbs., of which 98 per cent rests on the 2 wheels and only about 2 per cent on the implement pulled, so that nearly all of the weight is available for traction. Every Universal tractor unit has a Moline 2-bottom plow included in the price, which is $1,375 f.o.b. Moline. Complete electrical equipment, including starter, lights and engine governor, is furnished. A fully illustrated description of this tractor will appear in the next issue of AUTOMOTIVE INDUSTRIES.

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400,000 Motor Vehicles Registered in New York

NEW YORK, May 28—During the first 4 months of 1918, there were registered in New York state 400,000 motor vehicles, as compared with 411,000 for all of 1917. During the same period, there was collected from the 1918 registration $4,100,000, as compared with a total collection of $4,250,000 for all of 1917.

Secretary of State Hugo stated that he expects to register a total of 500,000 motor vehicles, 150,000 chauffeurs and 125,000 private owners desiring to drive their own cars, during the year.

Manufacture of Gas To Be Shown

Complete Apparatus Used—Every Process of Manufacture Exhibited

NEW YORK CITY, May 28—The success of the Summer Meeting of the Society of Automobile Engineers, Dayton, Ohio, June 17-18 is assured by the sale to date of 708 tickets to the Orville Wright dinner to be held Monday evening, June 17.

One of the interesting demonstrations of the meeting will be a complete manufacturing apparatus for gasoline, lubricating oil, and the other products of crude oil. Special demonstrating equipment for this work is being made up for the meeting and a corps of four or five chemists is being trained to carry out the demonstration before the members. C. W. Stratford, S. A. E. member, and oil chemist, is in charge of the demonstration. He is also preparing an explanatory talk, which will be given while the demonstration is in progress. The complete distilling apparatus will occupy several tables, so that an audience of 600 or 700 will have an opportunity of following the work. This is the first time that any such demonstration of this magnitude has been attempted.

The other educational exhibits that are planned to be part of the 2-day program have nearly all been arranged for. The exhibit of airplane wings and fuselages will show the progressive manufacturing stages through which these pass, and as good a conception of these parts in construction and the jigs used in the manufacture will be obtained as if a visit through a factory were undertaken.

On Wednesday following the 2 days of the meeting an opportunity will be given many members to visit some of the Dayton factories. These visits will not in anywise be a part of the S. A. E. program. So for as the S. A. E. is concerned, its program will end Tuesday night. The visiting of Dayton factories during Monday and Tuesday by S. A. E. members will not be countenanced, as the Dayton factories have agreed that there will not be any disturbance of the sessions owing to members visiting factories.

A British army officer who has been in the British transport service since the start of the war, and who is connected with one of the large British engineering houses, will give a special talk on the problems of motor truck transport work in the war zone.

Training Mechanics in Colleges

650 Being Taught Principles by Practical Methods in the University of Pittsburgh

WASHINGTON, May 24—Special education of drafted men by universities and colleges is working successfully. The committee on education and special training of the War Department, in a report, shows that the University of Pittsburgh is training 650 men for service as gas engine and automobile mechanics in the army. When this plan was announced in March the University of Pittsburgh discussed provisions of training and housing 100 men. Less than a month later 326 men were taking instruction. To-day there are 650 men. It is anticipated that there will be 2000 by Aug. 1, and the university is preparing to enlarge its facilities even beyond that point.

The work at this particular university was confined to the training of gas engine and automobile men, first, because there were a number of members of the faculty who were specialists in gas engines; second, because there were in the city many automobile repair shops from which practical men could be taken to give instruction; and, third, because the city offered an opportunity for obtaining, without transportation, a large variety of worn and broken automobiles, an essential in conducting the practical course which was planned. Both the equipment of the university and its location made possible an effective co-ordination of instruction, material and housing necessary for the work.

Repair Men As Instructors

The problem of instruction has been met by collecting about 45 of the best automobile repair men in the city, who, under the leadership and coaching of faculty members, have proved successful teachers. They were men without academic experience, but with experience in the kind of concrete practical teaching demanded. It is continually impressed upon the instructors that the work they are doing is important; that if one-fourth of the men they train prove to be poor mechanics it is just as serious or probably more serious than if one-fourth of the shells made in a munitions plant should fail to explode.

The material for use in the course comes from three sources: new trucks and engines from the government, old and dilapidated cars which have been purchased outright by the university, and cars and trucks in need of repairs which are obtained from firms and individual owners. Owners of cars pay for new material, but no charge is made for labor. The owner is allowed to choose whether he will have his car put in "first class," "fair," or "running" condition with a corresponding range in the expense for new material. The university has provided shop equipment and individual tool kits for each student.

The university first met the housing problem by making use of the armory gymnasiums and other buildings which could be temporarily adapted for sleeping purposes and for the feeding of men. Barracks are now being built which by Aug. 1 will accommodate 2000 men. Shops have been built for 580 men. These are being extended. A mess hall seating 1200 men will be completed by June 15.

The whole character of the instruction is practical. No more theory is given than is absolutely necessary.

It has been found possible to maintain the most intimate connection between the military and mechanical aspects of the work. According to their officers, the men learn the routine of drill nearly as fast as they would if they gave their whole time to it. Their excellent morale and fine spirit show alike in the energy with which they attack the problem of diagnosing the complaints of a broken down automobile and in the zest with which they go through the maneuvers of their military drill. The men are not allowed to feel that there is any distinction between their mechanical and military work. They are responsible for doing their duty in both.

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No Licenses Needed for Motor Trucks

NEW YORK, May 25—President Wilson's proclamation requiring that manufacturers, dealers and jobbers of farm implements and equipment obtain licenses will not apply to manufacturers, dealers and jobbers of motor trucks. The National Automobile Chamber of Commerce has issued a statement to the effect that Washington officials state that the word trucks in the proclamation is intended to relate only to small trucks used on farms and will not affect motor truck manufacturers for the present, although later, in the case of companies which sell a major portion of their trucks to farmers, a ruling might be made requiring such companies to take licenses.

It was the intent of the proclamation to eliminate profiteering in the handling of food supplies and to prevent injurious speculation and manipulation in the manufacture, sale and distribution of farm equipment used in the production of food. The proclamation specifically includes tractors, trailers and trucks.

Retailers of farm equipment including trucks, trailers and tractors, will not be required to obtain licenses under the recent Presidential proclamation. Retailers are defined as "a person, co-partnership, firm, corporation or association not doing wholesale business, and with gross sales not exceeding $100,000 per annum."

However, under provisions of the proclamation, steps will be taken to prevent profiteering by retailers. They will not be allowed to make unjust charges, unreasonable rates nor contract for more equipment than is demanded by the reasonable requirements of the business.

Further explanations of this licensing order will be made public by the Food Administration in the near future.

Taxation Problems Clearing Up

N.A.C.C. in Conference with Treasury Officials—Rulings in 2 Weeks

NEW YORK, May 25—Automobile taxation matters about which the National Automobile Chamber of Commerce conferred with treasury officials yesterday are gradually clearing up, and though no definite ruling is expected for at least 2 weeks, the situation is promising.

Under the original ruling a manufacturer's branch was held to be separate and as such was required to pay a tax of 3 per cent on the retail value of cars sold, whereas a manufacturer selling that car to a dealer who, in turn, sold it at retail, was required to pay 3 per cent only on the price to the dealer. It is expected that this will be straightened out and that the manufacturer's branch selling at retail will be placed on the same footing as a dealer.

Another matter which was discussed was the tax on a tax. Under the original ruling a manufacturer who sold a car to a dealer at wholesale for $800, for example, the dealer's tax in this case being 3 per cent, or $24, was required to make a return to the government on both the price of the car to the dealer—$800—and the $24 tax. In other words, his return was on $824. It has been pointed out that this is manifestly unfair and the ruling probably will be changed.

Maker to Pay Chassis Tax

Under the original ruling a manufacturer who sold a chassis direct to a user was required to pay a 3 per cent tax, whereas if he sold the chassis to a dealer the dealer was required to pay a 3 per cent tax on the chassis and also on the value of any body applied to it. It is considered likely that this ruling will be changed so that a manufacturer will pay a tax of 3 per cent on the chassis regardless of the person to whom it is sold. The dealer probably will pay 3 per cent only on the value of the body applied to the chassis.

When parts of automobiles were exported and assembled abroad no tax was levied on the cost of the parts, under the old ruling. Under a recent decision of the Supreme Court, however, this ruling has been suspended temporarily pending a review of the situation. It may be that exporters of disassembled automobiles will be required to pay a 3 per cent tax.

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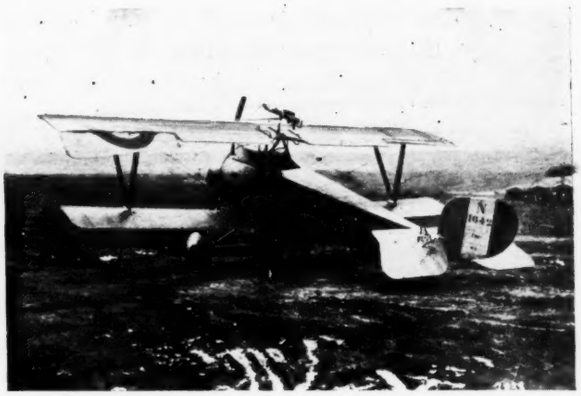
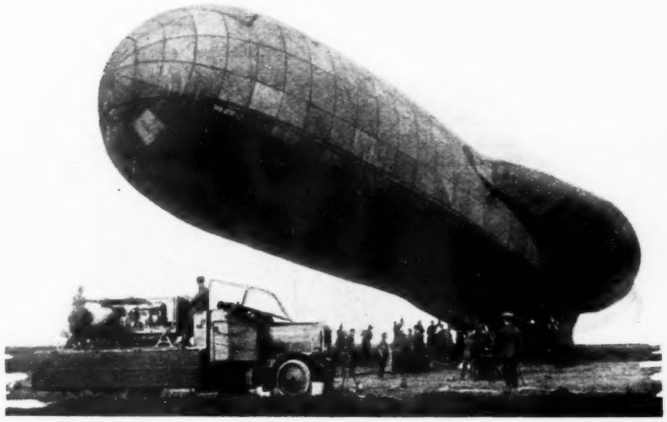
No Fuel Oil for Yachts

WASHINGTON, May 24—The Fuel Administration will issue an order shortly prohibiting the use of fuel oil by private yachts during the present war emergency. By private yacht is meant any vessel not operated for profit.

Airplane Activities of the Allies on the Western Front Are Attracting World-Wide Attention

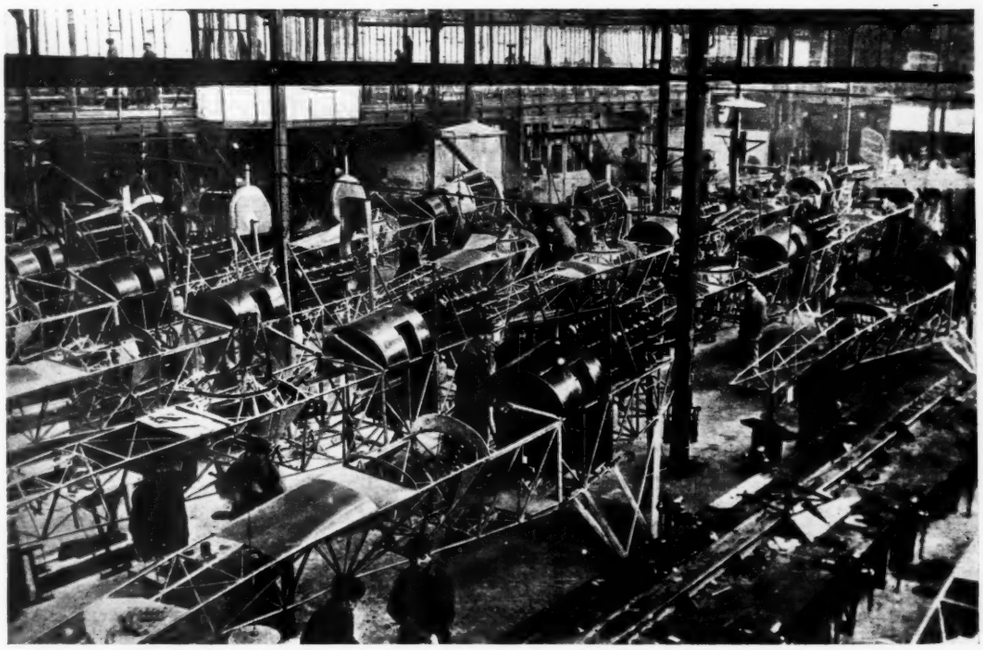


Left—A French hydroplane leaving the French air base at Dunkirk for a scouting expedition. French hydroplanes are efficient in hunting out U-boats. Right—The latest type of French Spad. The machine gun is mounted on the upper wing. The pilot stands in his seat and fires while volplaning downward



The type of dirigible used on the west front for making observations

Major Raoul Lufbery, in the uniform of an American officer, after being transferred from the French Flying Corps



Interior of one of the largest airplane factories in France. It is understood that France is turning out 75 to 100 planes daily

Photo © Kadel & Herbert, New York

A.A.A. Adopts Specific Highway Program

Roads and Bridges Adequate for Heavy Motor Truck Traffic, Sign-Boarding of Commercial Routes, and Connecting of State Roads for Interstate Travel Included

ATLANTIC CITY, May 24—A specific program for highway construction was adopted by the American Automobile Association, at its annual meeting held here to-day. The program embraces roads and bridges adequate for increasing heavy motor truck traffic as well as sign-boarding of commercial routes and building commercial trunk lines right to state boundaries so as to give connected highways for interstate traffic. The resolutions adopted in brief are:

1. Because high rates are an essential part of our transportation system the War Industries Board should be urged to place road building material and road building machinery on the priorities list.

2. That the several committees of the War Industries Board having jurisdiction over the issue of new securities and approval of bond issues for improving main highways approve without delay all of such matters.

3. That as properly constructed and maintained highways are vital to our national needs the following road building is deemed best:

a—Roads and bridges should be so built and maintained that they will withstand the constantly increasing heavy motor truck traffic.

b—Roads and bridges should be built wider than they have been in the past so that they can accommodate both the slow moving freight traffic and the faster moving passenger traffic.

c—Moneys received under the Federal Aid Road Act, as well as moneys received from State and rural sources, should be first applied to connecting the larger centers of population by main trunk highways.

d—These main trunk highways should be continued to State boundary lines so as to link up with adjoining States for interstate traffic.

e—The policy of a new removal should be encouraged.

f—The greater share of the nation's transportation being placed upon the highways calls for greater Federal, State and county appropriations.

4. Intercity highways for commercial traffic should be well sign-boarded.

5. The patrol system of road maintenance should be universally adopted.

The question as to the extent to which the A. A. A. should take up the work of commercial transportation has been referred to a special committee. Under war conditions it was the prevailing sentiment that the major percentage of the activities of the association should be devoted to this work. David Beecroft, directing editor of AUTOMOTIVE INDUSTRIES, in speaking on this subject was of the opinion that 80 per cent of the association's work in the next year might be devoted to this field.

He recommended that a special board of the association take this matter in charge, but the Resolutions Committee voted that the actual handling of the activity be referred to a committee to be appointed by President Jameson, who is instructed to confer with the Motor Truck Committee of the National Automobile Chamber of Commerce as to the best method of handling this new phase of the association's activities.

Mr. Beecroft recommended many activities which could be worked out by such a highway transportation board. It would be possible to co-operate with such recent highway activities as: Overland delivery of motor trucks; return load movement; rural express; long-distance intercity haulage; store-door delivery; congestion at railroad terminals; snow removal; coal distribution from certain mines not served with railroads, and the development of the motor truck for all incoming and outgoing freight within a radius of 25 miles of the center of large cities.

Many new activities for such a board were suggested among which might be mentioned: research on snow removal; the publication of a monograph covering this and intended for general distribution; survey of highways especially needed for motor truck transportation with a view to seeing that bridges along them are adequate and that there are no connecting links between states that are not of modern construction and that the entire usefulness of the road is not interfered with. State investigations could be started showing the amount of traffic over different highways, and existing motor clubs should be urged to take up this work.

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Wallis Tractor Plant Damaged

RACINE, WIS., May 27.—The plant of the Wallis Tractor Co. at Racine, Wis., was damaged by fire on May 20, but production is going on at practically the same rate as before. The burned structure will be replaced at once and new machinery and equipment already has been ordered so that little interruption will result.

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Motor Truck Transportation for Iowa

DES MOINES, IOWA, May 27—Iowa's first motor truck transportation company has been formed under the style Cross Country Transportation Co. The capital stock is $25,000. T. A. Minardi is president of the company. Routes are now being planned and motor trains will operate on regular schedules. Freight will be received and discharged at all stations.

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Mayo Radiator to Have New York Factory

NEW HAVEN, CONN., May 27—The Mayo Radiator Division of the Marlin-Rockwell Corp. will move its entire factory from this city to Southern Boulevard and 143 Street, New York City, on June 1. The new factory will be 5 stories high, and double the present capacity of the company. A spur track will be built into the building, and the factory will have lighterage on the Harlem River.

New York City was chosen as being the most convenient for transportation purposes.

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Striking Trimmers Come Back to Olds

LANSING, May 25—Nearly all of the 80 trimmers who walked out of their department in the Olds Motor Works 2 weeks ago have returned. The walkout followed the action of the company in discharging two men from among their number.

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Continue Show in Grand Central Palace

NEW YORK, May 28—The Annual National Automobile Show will not be affected by the reported change in control of the Grand Central Palace. The statement made last week that the building had been sold to the Du Ponts is erroneous. The Palace is owned by the New York Central Railroad, and is leased to the Manufacturers & Merchants' Exchange for 50 years. What the Du Ponts bought was a controlling interest in that company.

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More Contracts for "B" Truck Parts

WASHINGTON, May 24—Following are contract awards placed by the Quartermaster Department for parts of the class B, 3-ton standardized trucks:

May 18.

Cook Spring Co., New York City; 34,000 coil springs.
Ross Gear & Tool Co., Lafayette, Ind.; 1,000 steering gears.
National Can Co., Detroit; 8,000 water cans.
National Machine Products Co., Detroit; 6,000 rear spring shackle subassemblies.
Imperial Brass Mfg. Co., Chicago; 4,000 gas-feed pipe subassemblies.
Gier Pressed Steel Co., Lansing, Mich.; 4,000 sprag assemblies.
Stewart Iron Works Co., Cincinnati; 4,000 sprag assemblies.
Hayes Mfg. Co., Detroit; 4,000 engine dust-pans.
C. A. S. Products Co., Columbus, Ohio; 2,000 steering gears.
Salisbury Wheel & Axle Co., Jamestown, N. Y.; 5,000 sprag release assemblies.
Michigan Plant Steel Products Co., Detroit; 5,000 reach rods.
Metal Forming Corporation, Elkhart, Ind.; 4,000 exhaust pipes.
Barbee Wire & Iron Works, Lafayette, Ind.; 3,000 radiator guards.
Detroit Gear Co., Detroit; 4,000 clutches.
Sheldon Axle & Spring Co., Wilkes-Barre, Pa.; 2,000 sets axles.
Gier Pressed Steel Co., Lansing, Mich.; 4,000 radiator guards.
Waukesha Motor Co., Waukesha, Wis.; 2,000 motors.
T. W. Warner Co., Muncie, Ind.; 1,000 transmissions.
American Chain Co. (Inc.) Bridgeport, Conn.; 16,500 sprag stay chains.
Buffalo-Pitts Co., Buffalo, N. Y.; 2,000 radiator guards.
Perfex Radiator Co., Racine, Wis.; 2,000 radiators.
Fedders Mfg. Co., Buffalo, N. Y.; 3,000 radiators.
Michigan Plant Steel Products Co., Detroit, Mich.; 5,000 starting crank assemblies.

Return Loads Help Manchester

90 Per Cent of Vehicles Which Travel 10 Miles Out of City Are Loaded for Trip Back

LONDON, ENGLAND, May 1—The Return Load movement which started in the Manchester district about a year ago, where it is handled by the Manchester Chamber of Commerce, has gained heavily in the last year so that to-day 90 per cent of the vehicles traveling 10 miles or more out of Manchester carry return loads. For shorter distances it is more difficult to obtain loads.

The Manchester Chamber of Commerce employs an expert manager in charge of the work, and the Chamber has advertised consistently in local papers, so that those business houses which have loads traveling in one direction only will cooperate in the Return Load movement. The district surrounding Manchester is so compact that the scheme worked satisfactorily from the start. The office of the Return Load Bureau is well known to all business houses so that the work is largely that of collating on the one hand the vehicles that are returning empty and on the other hand loads that are awaiting transportation.

The Manchester and Liverpool area has always been a leader in highway transportation. It was in 1898 when an organization known as the Road-Carrying Co. of Liverpool started long-distance hauling of cotton goods from the Liverpool docks to the manufacturing towns in Lancashire. Heavy steam vehicles with trailers were used.

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Truck Production Limited Only by Steel

DETROIT, May 27—Steel is the only limitation on truck production this year. Not only does the war demand necessitate the capacity production of practically every truck factory in the business, but the commercial demand itself is exceedingly high. There is hardly a truck factory which is not producing a large percentage more this year than a year ago.

Packard production is now between 75 and 80 per cent war work. The company will produce in the year ending July 1, 1918, only 6000 passenger cars. The present rate of production is not sufficient to turn out 6000 cars a year, however, but the 6000 has been reached because in the beginning of the year Packard was heavily in production. At the present time the company is making about 350 passenger cars a month, and will probably maintain this schedule as long as possible. During 1917, 9000 passenger cars were manufactured.

The Packard schedule for example is between 9000 and 10,000 trucks, as compared with 5500 a year ago. The present production schedule of trucks is at the rate of 1000 per month, and of these more than 500 go to the United States government. In July, 1917, the company started with the intention of turning out 1200 passenger cars a month, but it was only possible to follow this schedule for a limited length of time. At present, 300 to 350 per month represent the output. The Packard truck production however, does not affect the passenger cars which are displaced by Liberty engine manufacture.

What has been said of Packard and its war truck work applies with modification to other concerns. Republic, for instance, about a year ago, was turning out 86 trucks a day, is now turning out 100 a day. Federal has increased from 11 to 16 a day, and even in smaller concerns in which output is limited, the production has markedly increased. This is true of organizations such as Denby, Acason, and in fact every truck company in the business.

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To Appropriate $990,250,812 for Aviation

WASHINGTON, May 27—The Army appropriation bill submitted to the House of Representatives Saturday calls for $990,250,812 for aviation, not including several hundred thousands of dollars to be expended for machine guns and other munitions for the airplanes, bringing the total to more than a billion dollars. An additional $75,500,000 is asked for armored motor cars in addition to the $272,422,550 already authorized.

The Senate Military Affairs Committee report on the bill shows that the United States now has 1316 airplanes in France. 323 of which are combat planes. There are 3760 military airplanes at 27 training camps in this country. The aviation section of the Signal Corps has 12,167 officers and 136,761 enlisted men.

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Factory Capacity Sufficient

(*Continued from Page* 1056)

serious factor. Detroit is already short 25,000 workers. It will be necessary for many factories employing great numbers who cannot speak our language to start schools for teaching English to the workers. It has been demonstrated that individual efficiency has been increased 25 per cent by the workers studying the language. Where the workers speak English there are fewer accidents and a smaller rejection of parts in process of manufacture.

Mr. Beecroft said it is thought that perhaps the peak of our transportation difficulties will come in July or August. By this time many of our factories working on war orders will be in production. For the past year some of these have been building new factories, making additions and tooling up for production. This work is now completed. Production is gaining headway and the curve of increase will rise very rapidly by July or August.

The real solution of the transportation question rests in building more locomotives, more railroad cars and more trucks. These will handle the increased transportation and should result in reaching a peak where it will be possible to increase the output of steel to meet all industrial needs. In other words, if transportation were adequate to the national demands there would be no necessity to talk curtailment of industries and no necessity to divide industries into war and non-war classifications.

Requa Denounces Oil Profiteers

Says That in Certain Sections Producers Are Withholding Supply for Price Advance

WASHINGTON, May 23—Efforts by oil producers to withhold production and increase prices are denounced by M. L. Requa, director of the Oil Division, United States Fuel Administration, in a letter addressed to A. C. Bedford, Petroleum War Service Committee, New York.

Mr. Requa stated: "I have been informed that in certain localities there is a tendency on the part of oil producers to withhold production in anticipation of increased prices either in the form of increase in the posted price or in the amount of bonus paid.

"I cannot too strongly emphasize the statement that the Government will not at this time view with approval any further advance in the price of crude oil. Because of the war and the demands that are being made for various essential products it is obvious that the law of supply and demand has broken down.

"In many lines bidding up the price will not produce a single additional pound of material. Such price advances cannot be permitted by the Government if we are to eliminate profiteering and maintain fair and reasonable prices.

"Will you therefore make it plain to the producers of oil that the Oil Division believes there is no justification for an advance in the price of crude oil at this time, and will expect the industry to cooperate with the Oil Division in an endeavor to maintain existing prices as maximum prices.

"Competition in the form of payment of bonuses should also be restrained. I do not mean by this that varying prices should not be paid for oils of varying quality, but these differentials once established should not be further advanced.

"I shall be obliged if you will give full publicity to these views and take the matter up with the Advisory Committee on Production affiliated with your committee for full consideration and report."

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Curtiss Building New Battleplane

BUFFALO, May 28—The Curtiss Aeroplane & Motors Corp. has designed a new battleplane. Engineers of the company have been making exhaustive tests for the last 3 or 4 months. The new plane, which is light and will have a speed of at least 145 m.p.h., according to present tests, is strictly a Curtiss product. It was designed by Glenn H. Curtiss, and is equipped with a Curtiss engine. Final tests will be made in about 45 days.

Pennsylvania S. A. E. Inspects Hog Island

More Than 100 Members and Guests Attend Event Following Trip to Shipyards—Addresses by H. L. Horning, Ex-Congressman Moon, D. Ludlum and William B. Stout

PHILADELPHIA, May 25—More than 100 menbers and guests attended the annual dinner of the S. A. E. Pennsylvania Section, held at the Hotel Adelphia here this evening, after a boat trip to the Hog Island shipyards. Owing to the fact that it was Saturday afternoon, practically no work was going on, and the visitors had a fine opportunity of seeing the methods of construction employed in the new standardized cargo carriers and appreciating the vastness of the operations. At five o'clock the party left the island and upon its return to the city proceeded directly to the hotel.

Ex-Congressman Moon acted as toastmaster. Charles M. Schwab, chairman of the Emergency Fleet Corp., had been slated as one of the speakers, but was unable to be present and sent a telegram of regrets. Harry Tipper, manager of AUTOMOTIVE INDUSTRIES, was the first speaker and dealt with the labor problem, which he said would have an entirely different aspect after the war than it had before. He traced the development of the labor movement from the time when industry was carried on on an individualistic basis right up to the present. Mr. Tipper asked whether it would be possible for a government to live which was democratic politically but autocratic industrially, and made a strong plea for a democratic solution of the labor problem. The war, he said, had shown that nothing made labor so productive as to give it a proper incentive.

Ludlum Makes Address

Another speaker was D. Ludlum, who recently returned from France, where he went as a member of a delegation sent by the U. S. Government to study automotive developments. Mr. Ludlum said that a complete program for all transport work required by our operations in France had been worked out and had received the endorsement of the general staff in Washington. The magnitude of the operations could be gaged when he stated that between 50,000 and 60,000 trucks would be required in France for every million soldiers we sent across. One of the members of the delegation, Walter T. White, had remained in France to gather additional information.

Mr. Ludlum said that hereafter all vehicles used by the army would be purchased through the Motor Transport Service of which Colonel Fred Glover had just been appointed chief. This department would purchase the vehicles, inspect them at the factories, take them over the highways to the sea coast, where they would be turned over to the shipping department, then take delivery of them at the French port and deliver them to their proper destination.

Mr. Ludlum spoke of the immense docks which the United States Government is building on the river Gironde, a few miles from Bordeaux, which are 5 miles long. It will be necessary to transport all of the automotive equipment that is being landed in France from the United States over the highways from 350 to 500 miles, and it is most fortunate that France has a system of excellent roads. In a central French city there is being erected the largest service station and supply depot for motor trucks that the world has ever seen. The first unit of men for this service station numbered 3000. From this station all automotive requirements on any part of the front will be met, and all makes of cars will be overhauled there. To give an idea of the enormous size of the station, Mr. Ludlum stated that it would have 300,000 sq ft. of floor area on one level, and roller skates and bicycles would be used to get around on.

Imitates Italian Count

Quite an amusing feature of the evening was a talk by Tom Daly, who impersonated an Italian nobleman. Mr. Daly was introduced as a member of the Italian Air Mission, and probably not one of the audience suspected that he was not "a real count" until one of the audience rose to object to the remarks made by the speaker, and after the confusion which resulted had subsided the toastmaster announced that he had been imposed upon and that the alleged Italian count was in reality an Irishman, "our good friend Tom Daly, poet and humorist."

H. L. Horning, who had just resigned as director of the automotive division of the Q. M. C., spoke on the development of the standardized truck, giving the dates at which the first meeting was held, the designs were completed, the first trucks completed and the first regularly manufactured trucks delivered. He also spoke of the aircraft program and deprecated the criticism passed upon it, making the statement, among others, that the present output of Liberty engines of the Packard Motor Car Co. is greater than that of the greatest works devoted to aircraft engines in England.

Three Men Upset Program

Mr. Horning said it was a pity that it should lie within the power of three men to upset the standardized truck program. One of the best things in connection with the Liberty aircraft engine was that with it there was very little trouble with the exhaust valves, and whereas some of the best foreign engines went to pieces in eight minutes when operated under full throttle at sea level, the Liberty engine could be operated for days.

Mr. Horning said that the S. A. E. is arranging to make official tests of the engine in June and that the results will be announced at the summer meeting. Regarding the rate of truck production, Mr. Horning said that next month between 2300 and 2400 standard trucks would be produced and that within a short time trucks would be produced as rapidly as they could be shipped abroad.

The last speaker of the evening was Wm. B. Stout, technical adviser to the Aircraft Production Board. Mr. Stout pointed out the great difference between the development of aircraft production and that of production in other lines, such as ship building, due to the fact that there was no accumulated experience in aircraft production in this country when we entered the war. This was largely due to the patent situation, which made entrance into the aircraft industry equivalent to the purchase of a law suit. Apropos of the criticism made on the Liberty aircraft engine, some time ago a certain prominent British flyer, in speaking before a society composed of British and Canadians, said that he had driven every aircraft engine that had been used on the front, but he had never been behind an engine that would compare with the Liberty engine.

Mr. Stout said that on account of our tremendous service facilities we would have very little trouble with engines, and that most trouble would be with the so-called connecting details. Airplanes are now capable of climbing about as fast as the heart of the aviator will stand. It is America's part in winning the war to make the airplane a production job which it is not now.

Mineral Oil Satisfactory

As regards lubrication of aircraft engines, good service is given by both mineral oil and castor oil. The Liberty engine does not require castor oil. Mr. Stout also spoke of the German giant airplanes with five engines, which took part in recent raids on London, and which carry 3000 pounds of bombs, each bomb weighing 600 lbs. It had not yet been learned whether the engines were of the 160 or 260 hp. type. Two inch and three inch guns are now being used on airplanes and machines which are being used by the Germans to co-operate in infantry attacks carry an armor under the fuel tank and the cock pit. Recently many of the German Albatross planes have collapsed in the air, which is due chiefly to the fact that this plane was originally designed for a 160 hp. Mercedes engine, but later, in order to increase its speed and climbing power, a 260 hp. engine was substituted.

Schipper Heads Detroit S. A. E.

DETROIT, May 25—At a meeting of the Detroit Section of the Society of Automotive Engineers held last night, J. Edward Schipper, technical editor of Class Journal Co., was elected chairman; A. C. Hamilton, chief engineer of the Oakland Motor Car Co., vice-chairman;

Chas. Van Sicklen of the Van Sicklen Speedometer Co., secretary; Don T. Hastings, chief engineer of the Holley Carburetor Co., treasurer, and R. E. Wells, engineer Hyatt Roller Bearing Co., member of the national nominating committee to nominate officers for the national association in Dayton at the coming summer meeting.

The policies followed so successfully by the Detroit Section during the past few years in which a large percentage of the members are working members through their connection with various research and other committees, will be followed again this year. The membership of the Detroit Section is now 1200 and although a number of the members have been absent from the city due to connections with the Government at Washington and other points, the meetings have been well attended. During 1917-18 season the average attendance was in the neighborhood of 400. The meeting held last night will be the last to be held for the 1918 season.

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1500 Liberty Engines Already Made

DETROIT, MICH., May 27—More than 1500 Liberty aviation engines have been produced to date. At this time four concerns are in production. Packard has produced more than 800. The Lincoln Motors completed 150 in April, and will complete 200 in May. Cadillac and Buick have both started production. Ford will be in production in 2 weeks. Packard is producing 25 engines daily at present.

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Fuel Oil Prices for Allies Fixed

WASHINGTON, May 27—Prices of fuel oil for the Allies were fixed as follows:

F. O. B. Gulf ports—5½ cents per gallon by British Admiralty specifications. 5¼ cents per gallon by United States Navy specifications.

F. O. B. Atlantic Seaboard—7½ cents per gallon by United States Navy specifications.

Prices of standard white kerosene were fixed at:

F. O. B. Gulf ports—7½ cents per gallon.

F. O. B. Atlantic Seabord—8¼ cents per gallon.

Mexican reduced oil was fixed at 6 cents per gallon via. Atlantic seaboard.

These prices become effective May 20 for 60 days. The price of gasoline to the Allies was fixed yesterday by the Fuel Administration as follows:

F. O. B. Gulf ports—21 cents per gallon.

F. O. B. Atlantic Seaboard—23½ cents per gallon.

United States Navy specifications apply in both instances. Prices of aviation naphtha were fixed at the same time as follows:

F. O. B. Gulf ports—30 cents per gallon.

F. O. B.—Atlantic Seaboard—32 cents per gallon.

British specifications, 302 degrees Fahrenheit final boiling point, apply in both cases.

British Engineers Approve Coal Gas as Fuel

Committee Satisfied That This Can Be Used Effectively and Safely Instead of Gasoline— Owners of Gas Works Should Supply It for Traction Purposes and Permit Resale

LONDON, May 1—The Inter-Departmental Committee appointed last November to consider the substitution of coal gas for petroleum products as a source of power for motor vehicles has issued an interim report advising this action.

The committee is satisfied that ordinary town gas can be effectively, safely and promptly substituted for gasoline in engines such as are commonly fitted in motor vehicles, without reduction of the compression space in the cylinders. They regard it as reasonable to assume that 250 cubic feet of gas having a gross calorific value of 490-500 thermal units per cubic foot are equivalent to one gallon of gasoline. One thousand cubic feet at 4s then will have the same fuel cost as gasoline at 1s a gallon.

Flexible containers made of fabric complying with the specifications given in an appendix to the report, they consider should have a normal working life of 8 months, and this period they think may probably be increased by as much as 50 per cent if the fabric is continuously protected from the action of light by a suitable covering. The objection to using inferior fabrics is shown by the fact that after a month's use the loss of gas by leakage may equal the actual consumption.

Plan for Supplies of Gas

It is regarded as desirable that owners of gas undertakings should themselves be suppliers of gas for traction purposes and that they should also allow resale through motor depots and similar establishments. Except so far as shortage of coal or other war conditions may necessitate imposition of control or priority, there should be no restrictions upon the drawing of supplies for gas traction through suitable meters at consumers' premises or private filling stations, but the erection of a standpipe, pillar pipe or any filling installation on other than private property should be subject to the approval of the local authority concerned.

The reduction of demands upon rationed material and labor will be facilitated by the elimination from new installations of the older methods of measurement, and the installation of new meters in the construction of which tinplate is required could, it is believed, be avoided by the substitution of a rotary, inferential or other measuring instrument which will require little or no rationed material for its construction. It is desirable that the Board of Trade should empower local authorities to test and stamp such instruments, provided they are accurate within 2½ per cent plus or minus, and that both sellers and consumers of gas concur in their use. A standard inlet to the gas container is recommended, consisting of a 2½-inch iron gas pipe, screwed externally with the British standard pipe thread.

The price of gas for traction purposes should not exceed the price ruling in the district, when a supply is taken at the consumers' premises or any private filling station, and there should be an extra charge not exceeding one cent per 100 cubic feet for supplies taken at any other filling station or depot, with a minimum of three cents per filling. The report gives various recommendations as regards the attachment of flexible containers, and considers that gas equipped motor vehicles should be admitted to dock premises and wharves without any special restrictions.

Pressure Is Limited

For the present it is thought undesirable that semi-rigid containers of rubber and canvas or other proofed material should be charged to a pressure of more than 90 pounds per square inch, or should have an internal diameter exceeding four inches; and even so, to be safe, they should be armored with galvanized steel wire. Encouragement should, however, be given to the construction and use of semi-rigid containers of rubber and woven wire up to working pressures of 300 pounds per square inch, and the controller or priority should give the assistance necessary to permit the development of cylinders of this kind. A limited number of experiments on a commercial scale under special license from the Board of Trade when necessary should also be encouraged on gas compressed to at least 1800 pounds per square inch in rigid metal cylinders, plain or wire-wound.

Combine Evidence and Tests

Authority is asked to combine with the second stage of evidence from witnesses, experiments and tests by an expert subcommittee on portable gas-generating apparatus and high-pressure containers, as well as on questions relating to liquefaction, absorption, and enrichment, and on improved methods of securing the correct admixture of air with the gas.

The purpose for which the committee was brought together was to "to consider and report upon," and their decision was:

1. The employment of gas in substitution for petrol and petroleum products as a source of power, especially in motor vehicles, and the manner in which such gas may be supplied, stored, carried and used, with due regard to the safety of the public.

2. The action, if any, which should be taken by His Majesty's Government to

encourage and safeguard the use of gas for this purpose."

The report of the committee's work follows:

It appeared to us desirable to conduct our inquiry in two stages, the first relating to present war conditions, and the second to such altered circumstances as may be expected subsequently.

After full and careful consideration and discussion of the evidence, we, accordingly, have the honor to submit in this interim report our unanimous conclusions and recommendations concerning:

(*a*) The propulsion of motor vehicles by the employment of gas carried in flexible containers at or slightly above atmospheric pressure;

(*b*) approved limits to immediate experimental uses on a commercial scale of gas under compression for traction purposes;

(*c*) authority to enable the committee to proceed with necessary experimental investigations.

We shall, in continuing the work which you have entrusted to us, devote our attention to the conditions which should govern the extended use of gas under compression as a source of power when the necessary appliances and plant are obtainable.

Conclusions and Recommendations

(*a*) Supply and Employment of Gas in Flexible Containers

(5) *Safety and Simplicity.*—We are satisfied that ordinary town gas can be effectively, safely and promptly substituted for motor spirit as a fuel for use in internal-combustion engines of the types which are commonly fitted to motor vehicles, without reduction of the compression space in the cylinders of such engines.

(6) *Economy.*—It is reasonable, from a commercial point of view, to adopt a mean consumption of 250 cubic feet of ordinary town gas (with, say, a gross calorific value of 490-500 British thermal units per cubic foot) as the equivalent of one gallon of motor spirit, and on this consumption-ratio gas at 4s. per 1000 cubic feet shows the same fuel cost as motor spirit at 1s. per gallon, apart from interest on cost of installation and the maintenance of flexible containers and filling arrangements.

(7) *Gas Bags.*—Flexible containers should be made of fabric which complies with the specification in the appendix accompanying this report. The working life of such a container may be considered to be normally about eight months, and this may probably be increased by as much as 50 per cent when the material is continuously protected from the action of light, and otherwise by a suitable covering. Leakage of gas due to the porosity of inferior fabrics may after one month of use equal the actual gas consumption.

(8) *Supply.*—It is desirable that owners of gas undertakings should themselves be suppliers of gas for traction purposes, and that they should also allow resale through the intermediary of motor depots and like establishments. There should be no restrictions, except in so far as shortage of coal or other war conditions may render imposition of control or priority necessary, upon the drawing of supplies of gas for traction purposes through suitable meters at consumers' premises or private filling-stations.

The erection of a stand-pipe, pillar-pipe, or any filling installation on other than private property should be subject to approval of the site by the local authority concerned, and, if agreement is not reached within 14 days of delivery of written notice and application, the owners of the gas-undertaking or other applicant should have a right of appeal to the local government board to appoint an inspector to decide between the parties.

The deviation of any gas-propelled motor-bus from an omnibus route which was established prior to March 1, 1916, for the purpose of obtaining occasional or regular supplies of gas, or of avoiding any bridge or other obstruction, should not be treated as a breach of Section 20 of the Local Government (Emergency Provisions) Act, 1916.

(9) *Measurement.*—Reduction of demands upon both rationed material and labor will be facilitated by the elimination, wherever possible, from new installations of the older methods of measurement. The installation of new meters in the construction of which tinplate is required can, we believe, in many instances be obviated by substituting a rotary, inferential or other measuring instrument, the manufacture of which will require little or no rationed material. It is desirable that the Board of Trade should empower local authorities to test and stamp such instruments for this purpose, provided that they are accurate within 2½ per cent plus or minus while capable of passing gas, and that sellers and consumers of gas should concur in their use.

Objection should not be raised to the sale of gas for traction purposes, on agreement between seller and consumer, by acceptance of mean volume per filling in respect of individual flexible containers. With a view thereto, the capacity, as ascertained at a pressure of 30 inches of a column of mercury and a temperature of 60 deg. Fahr. within the container, or as adjusted by calculation to comply with those conditions, should be certified and stamped on the container fabric, or on an attached identification label or disc.

(10) *Control of Filling.*—Where the pressure in the supply-pipe of the container may at any time exceed two inches of water above the pressure of the atmosphere, it is advisable that, instead of relying solely upon hand control, the physical movement of the container should, at a point lying between nine-tenths and full inflation, so actuate an automatic cut-off valve on the gas-inlet pipe as to stop the flow of gas into the container before the point of full inflation can be reached.

(11) *Standard Connection.*—The gas inlet to the container on any vehicle in general use should be of iron gas-pipe, of 2½-inch bore, screwed externally with the British standard pipe-thread to take a union for that size of pipe, and such union should be fitted permanently to the end of the flexible tube or other connecting pipe through which the gas is passed from the source of supply.

(12) *Price of Gas.*—The price of gas for traction purposes should not exceed the ruling price per 1000 cubic feet in any area of supply, subject to the district rates of discount (if any) according to quantity, if the supply is taken at the consumer's premises or private filling-station on any agreed system of measurement.

There should be a charge of not more than 2d. per 100 cubic feet over and above the ruling domestic rate for the area, in respect of any supplies for traction purposes which are drawn at any filling-station or depot other than at the consumer's premises or private filling-station in order to cover labor and service, with a minimum of 6d. per filling.

(13) *Depot Storage Under Pressure.*—The consideration of this branch of the subject has been deferred with a view to evidence being taken thereon during the later stage of inquiry.

(14) *Attachment.*—Flexible containers should be constructed with a valance extending the whole length of their compass along a horizontal line at not more than half the height of the container when fully inflated. The finished valance should be of at least double the tensile strength of the fabric in the body of the container, and, in the absence of means of continuous attachment to the vehicle's structure or roof, should be eyeletted to receive metal rings at intervals of not more than 2 feet and thereby securely held to the roof of the motor vehicle or to rails or a framework thereon.

Any composite container, i. e., one which has a lower box-portion made of boards or scantlings lined with fabric or otherwise rendered gas-tight, should as regards the collapsible portion comply with the specification given in the appendix, and the gas-capacity of the collapsible portion should be approximately the same as that of the rigid portion.

A flexible container should be mounted on and attached to any motor vehicle in such a manner that on partial or total deflation during use the collapsing portion shall at all times fall within the base of a retaining tray, a box-sided structure, or covered scantlings, of a minimum height of 18 inches, and due provision should be made to prevent "chafing" of the fabric.

The over-all height of any container and the vehicle carrying it should at no time exceed 17 feet from the ground.

No container should at any time extend beyond the greatest over-all width of the motor vehicle to which it is attached.

When a flexible container is carried on a trailer, the fabric of the container should be protected by a separate covering of canvas or other material stretched over hoops or other sufficient supports of wood or metal, or by a light enclosing structure of wooden laths or the equivalent.

There should be a positive cut-off valve and an automatic non-return valve between the flexible container and the point of gas-delivery to the carbureter-intake or the induction-pipe of the engine.

(15) *Use.*—There should be top-ventilation to the outside atmosphere, in any building which is used, either permanently or temporarily, for the purpose of housing or otherwise accommodating any vehicle which is equipped with a flexible container with gas inside it.

Any flexible container should be completely deflated if the vehicle to which it is attached has stood idle for more than two weeks.

It is recommended that, in the event of a priority of gas-supply being established, any differentiation in respect of the quantities of gas sold for traction purposes should be on the basis of the priority which attaches to the purposes for which the transport in question is required.

It is recommended, having regard to the satisfactory insurance testimony, that gas-equipped motor vehicles be admitted to dock premises and wharves without the imposition of any special restrictions.

(*b*) Approved Uses of Gas Under Compression During the War Period

(16) *Semi-Rigid Containers.*—It is undesirable that semi-rigid containers of rubber and canvas or other proofed fabric should at present be allowed to be charged with gas to a pressure greater than 90 lb. on the square inch, or should be of a larger internal diameter than 4 inches, and even with these limitations containers of this class are, in the opinion of the committee, unsafe if not properly armored with galvanized steel wire of 0.012 inch diameter (No. 30 B. W. G.).

Encouragement should be given to the construction and use of semi-rigid containers of rubber and woven wire, up to working pressures of 300 lb. on the square inch, and it is recommended to the Controller of Priority that he afford such assistance as may be necessary to permit developments of this description of container.

(17) *Metal Cylinders.*—It is desirable to encourage forthwith, under special license from the Board of Trade where necessary, a limited number of experiments on a commercial scale with compressed gas in rigid metal cylinders, plain or wire-wound, at pressures up to at least 1800 lb. (120 atmospheres) on the square inch, in connection more particularly with certain of the larger motor-omnibus undertakings and the transport departments of certain of the more important municipal authorities, in order to obtain data for dealing with this post-war development.

(*c*) TECHNICAL INVESTIGATIONS

(18) It is expedient to proceed with experiments and tests in connection with the determination of factors affecting portable gas-generating plants, and the commercial use of gas for traction purposes in containers at high pressures, together with questions relative to liquefaction, absorption and enrichment, as well as in regard to improvements in the existing arrangements for effecting the admixture of gas and air in the requisite proportions under varying conditions. Authority is, accordingly, now asked to combine with the second stage of evidence by witnesses independent investigations by an expert sub-committee, under our general direction and control.

It is recommended that, where necessary, any such experiments and tests should be conducted under a special license, granted by the Board of Trade, in respect of any gas-consumption involved.

APPENDIX — SPECIFICATION FOR TOWN-GAS CONTAINER FABRIC

(1) *Textile Components*

The textile components are to be:

(*a*) Outer Texture.—A cotton Wigan, preferably dyed khaki.

Weight: 4½-5 oz. per square yard.
Width: 42 inches.
Ends per inch: 60.
Picks per inch: 60.

(*b*) Inner Texture.—A grey cotton Wigan.
Weight: 4½-5 oz. per square yard.
Width: 42 inches.
Ends per inch: 60.
Picks per inch: 60.

(2) CONSTRUCTION

(*a*) Fabric.—The fabric is to be two-ply diagonally-doubled with the biased ply on the inside. Equal quantities of right-handed and left-handed biased fabrics are to be prepared by the manufacturer.

(*b*) Proofing.—The proofing is to contain not less than 90 per cent. of first grade native or plantation rubber uniformly and evenly spread between the doubled fabric.

(*c*) Weight of proofing.—To be 6 ozs. per square yard between the plies.

(*d*) Method of proofing.—The dried fabric must be given a priming coat thoroughly to impregnate the texture, followed by not less than six coats to build the proofing to the required weight.

(*e*. Vulcanization.—To be by the "hot" process employing steam heat. Dry heat and the "cold" process are prohibited.

(3) TESTS ON FABRIC

(*a*) Strength.—The strength of the finished fabric shall be not less than:

Warp 60 lb. per inch.
Weft 60 lb. per inch.

The tests will be made on a "constant rate of loading" machine. The rate of loading to be 150 lb. per minute per inch width, and the size of the specimens to be 2 inches wide and 7 inches between the jaws of the machine.

(*b*) Permeability.—The permeability of the fabric to hydrogen must not be more than 10 litres per square metre for 24 hours when tested on the N.P.L. type of apparatus at a constant temperature of 15.5 degrees Centigrade and an excess hydrogen pressure equal to one inch of water.

N.B.—10 litres per square metre per 24 hours is approximately 0.3 cubic foot per square yard per 24 hours.

8,000 Class B Trucks Ordered

Fifteen Makers Sign Contracts at $567 Per Truck—Producing 75 Per Day

WASHINGTON, May 25—Orders for 8000 Class B 3-ton standardized trucks, approved by the Board of Control, as told in AUTOMOTIVE INDUSTRIES for April 25, have been placed by the Motor Transport Service. It is expected that sixteen companies will share the order, the following fifteen already having signed contracts:

Gramm-Bernstein Motor Truck Co....Lima
Kelly-Springfield Motor Truck Co..Springfield
Indiana Truck Corp.....Marion, Ind.
Service Motor Truck Co.....Wabash, Ind.
Republic Motor Truck Co.....Alma
Selden Truck Co.....Rochester
Bethlehem Motor Corp.....Allentown, Pa.
Diamond T. Motor Truck Co.....Chicago
United States Motor Truck Co....Cincinnati
Brackway Motor Truck Co.....Cortland
Velie Motor Corp.....Moline
Sterling Motor Truck Co.....Milwaukee
Garford Motor Truck Co.....Lima
Packard Motor Truck Co.....Detroit
Hurlburt Motor Truck Co.....New York

The trucks will be distributed through the various branches of the army as required. Each company awarded a contract will do assembly work, the parts having been received from other concerns, and will receive an assembly price of $567 per truck. Deliveries are to be completed between Aug. 1 and Dec. 1.

Ten thousand of the Class B trucks have already been ordered, of which more than 2500 have been delivered and 75 are being produced daily. The assembly price of $567 per truck is approximately $200 lower than the assembly price of between $700 and $800 which was reported for the first contract of 10,000 trucks. These contracts are awarded as a result of the work of Christian Girl, Director of Standardized Truck Production, and Col. C. B. Drake, of the Motor Transport Section, which is now joined to the Motor Transport Service of the Army by the recently announced pooling orders.

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"Motorless Sunday" Rumor False

ST. LOUIS, May 26—Assistant Secretary Holke, of the National Automobile Dealers' Assn., has been busy the past week answering questions of dealers and automobile clubs as to the "seven motorless Sundays" beginning June 1. He has replied to all inquiries that there is no official backing for such a plan. The association received the following information from Washington:

Restrictions on the consumption of gasoline by the general public are not yet considered necessary by the Fuel Administration. H. L. Requa, oil administrator, says the situation is being studied with a view of future action, but until the Government requirements of gas for aviation and military transport expand materially, no regulations will be enforced to obstruct ordinary use. The Administration does not believe that the situation will be changed within the next few months.

The Milwaukee Automobile Dealers' Assn. has already notified the N. A. D. A. that it has offered $1,000 reward for the arrest and conviction of persons who are disseminating the information as to the restrictions on the use of gasoline.

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Five More Car Prices Increased

NEW YORK, May 27—The following changes in price have been made during the past week:

	New Price	Old Price
Chandler, 2 and 4-pass.	$1795	$1595
6-pass.	3850	3500
Mercer, Series 4, 4 and 6-pass.	$3850	$3500
Mitchell, D-40, 2-pass.*	1350	1250
5-pass.	1350	1250
Coupe	1900	1850
Sedan	2000	1950
C-42, 3-pass.	1565	1490
5-pass.	1625	1560
7-pass.	1625	1525
Coupe	2210	2135
Sedan	2375	2275
Moline-Knight C, 5-pass.	1750	1650
7-pass.	2085	1985
Roamer, C-6-54, 4-pass.	2375	2250

*Effective June 1.

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Price of Zinc Fixed

WASHINGTON, May 27—President Wilson has fixed the price of zinc until next September as follows: Grade A, 12 cents; plate, f.o.b. plant, 14 cents; sheet, f.o.b. plant, 15 cents. The prices are subject to the usual trade discounts and differentials in effect Feb. 13.

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Dividends Declared

The Detroit Valve & Fittings Co. has declared a monthly dividend of 1½ per cent on common stock, payable May 31 to stock of record May 25.

The Moline Plow Co. has declared a quarterly dividend of 1½ per cent on second preferred stock, payable June 1 to stock of record May 18.

The Packard Motor Car Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable June 15 to holders of record May 31.

Amazon Rubber Co., Akron, has declared a quarterly dividend of 1½ per cent on its common stock.

The Michigan Drop Forge Co., Pontiac, has declared a dividend of 20 cents a share on common stock, payable June 1.

The Pennsylvania Rubber Co., Jeannette, Pa., has declared the regular quarterly dividend of 1¾ per cent on preferred stock and 1½ per cent on common stock, payable June 29 as to stock of record June 15.

New Gyroscope Uses Told to S. A. E.

Robert Lea of Sperry Company Explains Its Adaptations to Cleveland Section

CLEVELAND, May 25—At a meeting of the Cleveland Section of the Society of Automotive Engineers held here last week Robert B. Lea, of the Sperry Gyroscope Co., gave an illustrated lecture on the adaptations of the gyroscope. Gyroscopic stabilization of aircraft and seagoing vessels, and the application of the gyroscope to the compass, were the principal subjects of the stereopticon and moving pictures shown.

Mr. Lea's lecture was explanatory of the views and motion pictures shown, these covering installations and demonstrations of the device on different types of crafts. The views were preceded by a short explanation of the principles of the gyroscope, in which Mr. Lea pointed out that any body which revolves is a virtual gyroscope. The two fundamental laws which control the gyroscope are:

1—Any revolving body revolving about another body tends to make its axis parallel with the axis of that body.

2—And will revolve in the same direction.

The principle upon which the gyroscopic compass operates is that the gyroscope tends to set itself parallel with the axis of the earth. Its advantage over the magnetic compass is due to the fact that it is not affected by surrounding masses of metal, and that it seeks the true north with an impulse 300 times as great as that of the magnetic reading. It is therefore possible on vessels such as large English battleships to have fifteen repeating compasses driven off the main gyroscopic compass. In these installations the gyroscope is a 12 in. wheel weighing 42 lb. revolving in vacuum at 8600 ft. per minute.

Owing to the fact that the compass on the submarine must operate when surrounded by metals and in a strong electric steel, due to the use of large storage batteries, the gyroscopic compass is an essential for the proper manipulation of the submarine. One of the questions asked of Mr. Lea during the short discussion afterward was whether or not the Germans are equipped with gyroscopes. He replied that although gyroscopes are used by them, there are certain attachments having to do with the facility of taking readings from the gyroscope of which they are not aware.

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Nicklis Heads Machinery Association

CLEVELAND, May 24—J. D. Nicklis, of Manning, Maxwell & Moore, New York, was elected president of the National Supply & Machinery Dealers' Assn. at the society's thirteenth annual convention held here last week. He succeeds Herbert W. Strong, who has just completed his third term as president.

Anton Vonnegut, of the Vonnegut Machinery Co., Indianapolis, was elected first vice-president. The other officers follow: Second vice-president, Crannell Morgan, of the Hardware & Supply Co., Akron, Ohio; secretary and treasurer, Thomas A. Fernley, Philadelphia. Members of the executive committee are: Edward G. Wells, of the Chas. H. Besley Co., Chicago; Ernest L. Davis, of S. H. Davis & Co., Boston; Robert F. Blair, of the Pittsburgh Gage & Supply Co., Pittsburgh, and Edward B. Hunn, of C. H. Mersick & Co., New Haven, Conn.

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Motor Trucks and the Barge Canal

NEW YORK, May 25—The importance of motor trucks in increasing the value to shippers of the newly-opened New York State Barge Canal was the topic of discussion at the monthly meeting of the Motor Truck Club last night. Laurence Hart, one of the engineers in charge of canal construction, was the speaker. He pointed out that 78 per cent of the population of the state is within a 10-mile radius of the canal, and an even greater proportion of manufacturing industries. He prophesied the establishment of motor truck fleets to supplement the work of the canal in facilitating delivery of goods shipped on its waters.

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Want Copper at 30 Cents

WASHINGTON, D. C., May 27—Representatives of the copper industry met in Washington last week and stated that 25 cents per lb. is insufficient and asked for an increase to 30 cents per lb. for the 3 months beginning June 1. Small producers said that they would have to discontinue business unless the new price is fixed at least 30 cents.

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Michigan Rate Hearing Postponed

DETROIT, May 25—The hearing on rate increases asked for by the Michigan Central Railroad has been postponed until June 3, to allow shippers time to digest the evidence presented by the Railroad, and prepare their side of the case. The increase sought applies to switching charges between intercity points, and transportation to nearby towns.

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Production of Idler Wheels Started

DETROIT, May 25—The Detroit Pressed Steel Co. is beginning production on its government order for idler wheels for tanks being manufactured by the Reo and Maxwell companies and the Van Dorn Iron Works.

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Long Flight by Liberty Seaplane

WASHINGTON, May 25—A large seaplane equipped with two Liberty engines flew from Philadelphia to Hampton Roads on Monday, May 20, in 3 hr. and 15 min. The plane carried five passengers, including the pilot. It was manufactured at the Naval Aircraft factory, Philadelphia.

Reports of Gasoline Shortage Untrue

Surplus of Petroleum in the Country at Present—Tank Cars Also Plentiful

WASHINGTON, May 27—Reports to the effect that a gasoline shortage prevails are entirely untrue. AUTOMOTIVE INDUSTRIES states authoritatively that at the present time there is a surplus of gasoline in this country. There is no shortage of transportation. Tank cars are standing idle in the yards of many gasoline distributers. News dispatches published in the daily papers recently that gasoline and kerosene were to be mixed for the purpose of conserving gasoline and another rumor that gasoline cards are to be issued and automobiles placed on a ration of 1 gal. per day are said by Government officials to be pure propaganda fostered by manufacturers of appliances designed to operate on kerosene or on a limited supply of gasoline.

Some Unsubstantiated Rumors

Government officials do not deny that there may be a shortage of gasoline in the future when this Government reaches its maximum power in the war. When many thousands of airplanes, tractors, tanks, trucks and passenger cars are employed for the big drive there is no question but that there will be some conservation of gasoline, but the suggestion of gasoline cards or of giving a ration of 1 gal. per day or to make a mixture of gasoline or kerosene are denounced as "wild, unsubstantiated rumors."

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"Coal Week" Dates Set

WASHINGTON, May 27—June 3 to 8 will be "Coal Week." During this week a special drive will be made by the Fuel domestic consumers to order their next winter's coal supply.

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Klaxon Absorbs Stentor Company

NEWARK, N. J., May 24—The Klaxon company has absorbed the Stentor Electric Mfg. Co. of Long Island City, N. Y. The autophone and other loud-speaking telephone instruments formerly manufactured by the Stentor company will be marketed by the Klaxon sales organization. The autophone business will be handled from the Klaxon company's office in the Hyatt Building, Detroit, Mich.

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F. E. Gregory

DETROIT, May 27—F. E. Gregory, confidential real estate agent for Henry Ford, is dead. He represented Ford in all his real estate transactions since 1911, and purchased all tractor properties on the River Rouge as well as Ford's Dearborn estate.

Air-O-Flex Automobile Corp. Buys Detroit Plant

DETROIT, May 24—The Air-o-Flex Automobile Corp. has purchased a small plant at 217 Franklin Street, and expects to begin manufacturing within 45 days.

The company has submitted an ambulance design to the Government. The vehicle will accommodate 20 persons, including two on the driver's seat; the ambulance now used at the front carries only 4 to 6. At first the company will manufacture complete trucks, but later will confine its efforts to suspension. Permission has been obtained from the state to sell 12,000 shares of its common stock below par, viz., at $5. Since May 1 stock has been selling at $7.50, which price will hold until the company's demonstrators are out, when par will be asked again.

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National Manufacturing Gets Government Order

WILLIAMSPORT, PA., May 24—The National Mfg. Co. has received an order from the Signal Corps for 3400 Hoover tire carriers for use on light aviation 1-ton trucks.

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Anderson Electric Factory Enlarged

DETROIT, May 27—A new building for the Anderson Electric Car Co. is now in course of construction. It will be 2 stories high and give 160,000 additional sq. ft. of floorspace.

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Federal Truck Using Women

DETROIT, May 27 — The Federal Motor Truck Co. has started to employ women in its assembly department. A force of nearly fifty women is at work in this plant and is proving satisfactory. The company is planning to add to this number.

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Metal Hose & Tubing to Add

BROOKLYN, N. Y., May 24—The Metal Hose & Tubing Co., manufacturer of Triplexed gasoline hose, has started the construction of an addition to its factory. The new building will give 5000 additional square feet of floorspace.

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New York Service Station for Cadillac

NEW YORK, May 27—The Cadillac Motor Car Co. will build a 12-story service station, warehouse and office building at Columbus Avenue and Sixty-second Street. The structure will be 100 x 150, the site having been bought last spring.

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Sayers Six Price Increased

CINCINNATI, OHIO, May 24—The Sayers & Scovill Co. has increased the price of the Sayers Six from $1,250 to $1,395.

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Government Orders Highway Trailers

EDGERTON, WIS., May 27—The Highway Trailer Co. has received a large contract to manufacture trailers for the Government. The company also has perfected a 2-wheel trailer, the first model of which has been shipped to Washington for exhaustive tests. The trailer is of 3-ton capacity. Previous types have been 4-wheel exclusively. The special construction of the new type gives only 75 lbs. draft on the drawbar per ton of load.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

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Shuler Axle Buys Louisville Plant

LOUISVILLE, KY., May 24—The Shuler Axle Mfg. Co. has bought a factory here comprising 40,000 sq. ft. of floorspace. The Detroit plant will be given up and all manufacturing will be done in the new building. The entire plant will be in operation within 90 days.

—

International Motor Employees Subscribe for $165,000 of Liberty Bonds

NEW YORK, May 25—Employees of the International Motor Co. subscribed to $165,000 of the $500,000 worth of Third Liberty Loan bonds purchased by the company. Payments in 10 per cent installments are being accepted by the company, and the last 10 per cent will be cancelled if the employee is still with the organization.

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Monarch Tractor to Increase Output

WATERTOWN, WIS., May 21—The Monarch Tractor Co. will increase its output to 30 tractors a week, in accordance with plans approved at the annual meeting of stockholders held recently. Two new sizes of tractors will be added as soon as practical.

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Milwaukee Subscribes to Red Cross

MILWAUKEE, May 27—A partial list of the subscriptions of automotive organizations to the Red Cross, in its second drive follows:

International Harvester Co. (Milwaukee works)	$20,000
A. O. Smith	10,000
Crucible Steel Casting Co.	1,000
Cutler-Hammer Mfg. Co.	5,000
Kearney & Trecker Co.	10,000
Kempsmith Mfg. Co.	5,000
National Enameling & Stamping Co.	2,000
Geuder, Paeschke & Frey Co.	1,000
Harley-Davidson	2,000
Walter Davidson	2,000
National Brake & Electric Co.	1,000
Geo. H. Smith Steel Casting Co.	1,000

Boone Tire Headquarters to Be in Chippewa Falls

CHIPPEWA FALLS, WIS., May 27—At the annual meeting of stockholders of the Boone Tire & Rubber Co. at the new plant here it was decided that after the annual meeting of the board of directors at the original plant in Sycamore, Ill., the offices and headquarters would be transferred to this city. The Chippewa Falls plant has been delayed in getting under way because of delays in receiving equipment. The machinery is expected shortly and the plant will immediately start production at a rate of 750 casings and tubes daily. I. V. McLean, president of the company, is now making his headquarters at Chippewa Falls. More than 250 of the 3000 stockholders attended the annual meeting.

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Government Order for Trenam Tractor

STEVENS POINT, WIS., May 27—The Trenam Tractor Co., which recently acquired the plant and business of the Central City Iron Works, and moved its headquarters to this city from Milwaukee, has received a contract for supplying gray iron engine parts for Government ships to the Allis-Chalmers Mfg. Co., Milwaukee. The Trenam company has sufficient capacity in its plant to continue the manufacture of tractors along the lines originally planned. Its machine will be in production within a week or two. A kerosene carbureter has been perfected and will supplant the gasoline-kerosene vaporizer used on the earlier models.

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Lavine Gear to Have New Factory

MILWAUKEE, May 27 — Contracts have been awarded for the erection of a new manufacturing group for the Lavine Gear Co., Racine, Wis., at Keefe Avenue and North Pierce Street. The main shop will be 150 x 275 ft., of reinforced concrete, brick and steel. The Lavine company manufactures steering gears and other parts for motor cars, trucks, tractors, etc.

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Obenberger Doubles Plant

MILWAUKEE, May 24—The John Obenberger Forge Co. has completed factory additions doubling the size of its plant. In 1917 the company manufactured $540,000 worth of forgings for truck, tractor and automobile engines. It is estimated that the 1918 production will reach the $1,500,000 mark.

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Fire in Airplane Plant

SAN FRANCISCO, May 25—Fifteen airplanes in various stages of construction, a large quantity of dried spruce and Irish linen were destroyed in a fire in the plant of the Fowler Aeroplane Corp. Factory officials had received threats before the fire occurred, it is reported.

McMullen Leaves Olds—Joins Quartermaster Corps

LANSING, May 25—E. J. McMullen, formerly in the technical department of the Olds Motor works received the commission of first lieutenant in the Quartermaster Corps of the National Army and has been ordered to report for duty at once. He was chassis lecturer for the Olds company during show seasons and has given technical lectures from coast to coast.

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Leslie L. Newton, secretary of the Luther Grinder Mfg. Co., Milwaukee, has resigned, and has been appointed secretary-treasurer and general manager of the Stegeman Motor Car Co., Milwaukee. He will continue as a director of the Luther company. His successor as secretary is Frank Hyland.

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C. E. Bedell has been appointed superintendent of the boat-hull works of the Curtiss Aeroplane & Motors Corp., Buffalo, in the old experimental shop at Austin Street.

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Lloyd I. Seaman has been appointed eastern district manager of the Knight Tire & Rubber Co., Canton, Ohio. He will have headquarters in New York.

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Henry Knippenberg has resigned as advertising manager of the Interstate Motor Co., Muncie, Ind., and has opened an advertising service agency in Detroit.

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Herman P. Schade has resigned as president and general manager of the Bearings Co. of Pennsylvania, Philadelphia, and has been elected president of the Chalsmith Sales Corp., New York. The company is the eastern distributer of the Gill piston ring and other specialties.

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H. J. Grosvenor, factory manager of S. F. Bowser & Co., Fort Wayne, Ind., has been elected secretary of the company to fill the vacancy caused by the resignation of Albert S. Bowser.

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Norman G. Wilson, who has been head of the Philadelphia branch of the Stanley Motor Carriage Co., has been promoted to the position of branch manager. His headquarters will be in Philadelphia.

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Men of the Industry

Changes in Personnel and Position

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Duesenberg Adds Testing Plant

ELIZABETH, N. J., May 28—The Duesenberg Motors Corp. is planning an addition to its plant. This will be used as a motor testing department.

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Ford Had Patriotic Parade

DETROIT, May 28—About 10,000 Ford employees were assembled in a patriotic parade on the evening of May 25 in Highland Park. Many banners were carried by the men. One of these read, "An Eagle a Day Keeps the Kaiser Away."

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Dodge District Managers Meet

DETROIT, May 28—The annual convention of the district managers of Dodge Brothers was held in Detroit this week.

Leigh Made Manager of Hackett Motor Car Sales

R. L. Leigh has been appointed general sales manager and director of the Hackett Motor Car Co., Grand Rapids. He was formerly supervisor of eastern sales of the Reo Motor Car Co., and later division sales manager for the Olds Motor Works.

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Entries Closed for Sheephead Bay Race

NEW YORK, May 27—The program for the Decoration Day meet at Sheephead Bay Speedway includes two events. The principal feature will be the 100-mile Harkness Trophy Handicap, for which 16 entries already have been made. The other event will be a 10-mile handicap which is to be run in two heats and a final. Entries formally closed at noon May 28. Both races are for non-stock cars of 300 cu. in. piston displacement or less. The complete list of entries follows:

Driver	Car	Handicap
Louis Chevrolet	Frontenac	Scratched
Ralph De Palma	Packard	1:01
Dario Resta	Resta Special	2:02
Ralph Mulford	Frontenac	2:05
Barney Oldfield	Golden Submarine	2:10
Ed. Hearne	Duesenberg	2:12
Tom Milton	Duesenberg	2:15
Ira Vail	Hudson	2:21
Omar Toft	Miller Special	2:35
Nicholas Dwick	Delage	2:50
J. J. Meyer	Delage	3:00
Denny Hickey	Hotchkiss	3:10
I. P. Fetterman	Peerless	4:00
Percy Ford	——	5:00
Rudolph Wehr	Wehr Special	6:00
Wm. Vetere	Duesenberg	6:00

The car which Resta will drive is a combination of the Peugeot chassis which he has previously driven fitted with an engine which he is understood to have built himself. For the 10-mile handicap, De Palma and Resta will be on scratch.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	58	60	—4
*J. I. Case T. M. Co., pfd.	85	89	..
Chalmers Motor Co., com.	6	8	..
Chalmers Motor Co., pfd.	30	40	..
*Chandler Motor Co.	80	82½	— ½
Chevrolet Motor Co.	123	126	—1
*Fisher Body Corp., com.	26	34	—1
*Fisher Body Corp., pfd.	80	87	..
Fisk Rubber Co., com.	52	55	+3
Fisk Rubber Co., 1st pfd.	98	103	..
Fisk Rubber Co., 2nd pfd.	70	75	..
Firestone Tire & Rubber Co., com.	90	93	—1
Firestone Tire & Rubber Co., pfd.	94	95	—1
*General Motors Co., com.	123	125	—2
*General Motors Co., pfd.	87	87½	+6½
*B. F. Goodrich Co., com.	43	45	..
*B. F. Goodrich Co., pfd.	99½	100	..
Goodyear Tire & Rubber Co., com.	141	144	—2
Goodyear Tire & Rubber Co., pfd.	96	98	..
Grant Motor Car Corp.	2½	3½	..
Hupp Motor Car Corp., com.	2¾	3¼	..
Hupp Motor Car Corp., pfd.	80	83	—2
International Motor Co., com.	22	26	+1
International Motor Ca., 1st pfd.	50	58	+2
International Motor Co., 2nd pfd.	33	37	+5
*Kelly-Springfield Tire Co., com.	45	45½	—1½
*Kelly-Springfield Tire Co., 1st pfd.	76	87	—1
*Lee Rubber & Tire Corp.	16½	17½	..
*Maxwell Motor Co., Inc., com.	27½	28½	+ ½
*Maxwell Motor Co., Inc., 1st pfd.	54	55	—1
*Maxwell Motor Co., Inc., 2nd pfd.	19¾	21	..
Miller Rubber Co., com.	100	103	—1
Miller Rubber Co., pfd.	94	95	—1
Packard Motor Car Co., com.	104	109	—3
Packard Motor Car Co., pfd.	91	94	..
Paige-Detroit Motor Car Co.	16	18	..
Peerless Truck & Motor Corp.	14	17	+1
Portage Rubber Co., com.	102	105	+3
Reo Motor Car Co.	14	15	—1
Saxon Motor Car Corp.	7	8	—1¼
Standard Motor Construction Co.	11	13	..
*Stewart-Warner Speed. Corp.	56½	57½	—1½
*Studebaker Corp., com.	41	42	..
*Studebaker Corp., pfd.	75	96	+6
Swinehart Tire & Rubber Co.	36	..	..
United Motors Corp.	24	25	..
*U. S. Rubber Co., com.	56½	57½	—1½
*U. S. Rubber Co., pfd.	103½	105½	— ½
*White Motor Co.	40	41½	— ½
*Willys-Overland Co., com.	19⅜	20	..
*Willys-Overland Co., pfd.	80	82	..

*At close May 25. Listed N. Y. Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	7½	..
Bower Roller Bearing Co.	18¾	20	+1⅛
Chevrolet Motor Co.	..	..	..
Commerce Motor Car Co.	10¼	11	+ ⅝
Continental Motor Car Co., com.	5½	5⅝	— ⅛
Continental Motor Car Co., pfd.	92	..	..
Edmunds & Jones, com.	14	17	..
Edmunds & Jones, pfd.	80	90	..
Ford Motor Co. of Canada	185	192½	+12
Hall Lamp Co.	..	14	..
Michigan Stamping Co., com.	..	13⅞	..
Motor Products	..	..	..
Packard Motor Car Co., com.	..	..	..
Packard Motor Car Co., pfd.	94	..	..
Paige-Detroit Motor Car Co.	..	17⅛	..
Prudden Wheel Co.	11¾	..	..
Reo Motor Car Co.	14⅜	14⅝	— ⅛

INACTIVE STOCKS

Atlas Drop Forge	..	26	..
Kelsey Wheel Co.	90	92	..

From report of Friday, May 24, 1918.

Distributers' Position Is Precarious

Factories Forced to Sacrifice Some to Save Others, Says Hupp, Vice-President to S. A. E.—Engineers Must Come to the Rescue with Substitute Materials

DETROIT, May 25—At the meeting of the Detroit Section of the Society of Automotive Engineers held here last night, Lee Anderson, vice-president of the Hupp Motor Car Co., delivered an address on the sales problems of to-day and tomorrow. Mr. Anderson told of the serious problem which confronts all manufacturers to-day in adequately supporting their dealers. The distributing organizations which have been built up during peace times are hard put to it to secure sufficient products to maintain their sales volume to a sufficient extent adequately to cover their investments. As a result, many of these distributing organizations are in a precarious condition and the problem relating to their maintenance is one of the most important features of the sales manager's duties at the present time. It is not a question of seeking a market for the product, but rather seeking a product for the market. A digest of Mr. Anderson's talk follows:

This is the age of the production manager and the engineer. This condition has been brought about by the shortage of material and transportation facilities which have so changed the situation that there is no real sales problem as a sales problem now. The age of the salesman, however, is coming. The war period is causing the erection of new factories and the expansion of old factories, which, after the war, will have manufacturing facilities which will far exceed those of the period before the war. It is then that the salesman will come in to dispose of the greatly increased production activity of the plant.

Engineering improvement is part of the coming problem. The engineer must have devices to sell. The world is learning to use new things, and the war is destroying the old things. Therefore, the great problem before engineers in the future is to produce new things which meet the demand for devices of the highest efficiency.

If there is any mistake that the United States is making it is a disregard for the future sales problems. This is not the case in Europe. Already engineers of great automobile manufacturing plants have been over to this country to study our market with a view of disposing of their products in this country after the war. Europe is studying the needs of America and engineers who come over here on war work always have their mind's eye on the future sales possibilities of their products in this country.

There is no sales problem connected with disposing of automobiles at the present time. All the automobiles that the factories can produce in the next 24 months will practically sell themselves. This is true because of the absolutely inadequate production at the present time, and the uncertainties of maintaining even this production during any definite period.

The position of the dealers is one which causes us the most concern. A considerable proportion of the dealers now in business are wondering how long they can keep their doors open; they are scrambling for cars and will take any cars which they can secure and any lines which they can secure, because of the insufficient quantity now being produced.

The industry owes a debt to the dealer which it must always keep in mind. It is up to the industry to keep these dealers in business, and yet this is one of the most difficult problems which could possibly be faced. If the production of the factories is spread too thinly over the entire country it does not do any of the dealers any good, and all of the dealers would have to close their doors. Therefore, it becomes a matter of selecting the dealers and sacrificing some to keep the others alive.

Speaking of the Hupp company, Mr. Anderson stated that one of the biggest reasons for supporting the dealers, outside of the debt which the industry owed them, is the fact that the dealer organization is what maintains public opinion, and public opinion is required to sell any car. He stated that in the 9 years that the Hupp company has been in existence it has spent over $5.000.000 to create a market. This is small as compared with some companies. Willys-Overland spends one and one-half million dollars alone per year. Public opinion is the foundation, and all of these millions will be wasted if this public opinion is lost, and it can be lost by losing dealers.

The Hupp company has three rules by which it works out its eliminations of what might be called non-essential dealers, in order to keep the really essential ones alive. The first question which is asked is: "Is the automobile business a side line. or is it the principal source of income?" If not absolutely dependent upon the automobile business, the concern can be eliminated. The second question asked is: "To what extent is he dependent on one product or one line?"

If he has a variety of lines he cannot be considered as essential to the company as the dealer who lives only by the sales of the one line. The third question asked is: "How large an organization is at stake, how much overhead does the organization carry?" This is highly important because a dealer having a high overhead and maintaining a big organization for the purpose of distributing the product of the company must have more cars in order to maintain the standing which he has created for himself.

It is necessary that the automobile manufacturer maintain a market for his product because this market will be multiplied a hundred-fold after the war. The country cannot do without cars. When the passenger cars of the country are cut down, the efficiency of the people of the country is also cut down; furthermore, the possibility of cultivating remote expanses of farm territories is also reduced.

Only 2 per cent of the entire amount confess that their cars were bought for pleasure purposes. The day of the passenger car as a joy-riding proposition has passed, because the percentage used for purposes of this kind is so small that it need hardly be considered.

There are really five reasons behind the curtailed production. These are as follows:

1—Transportation, not only of the outgoing cars but of the incoming materials. 2—Labor; scarcity and price. It is a noteworthy fact that in spite of the 20,000 shortage in Detroit, there is an average idleness of 12,000. 3—Steel. 4—Coal. 5—Rubber.

Engineers should be closer to the sales department. The engineer of to-day is inclined to be arbitrary. He is inclined to believe that because he has designed something which he believes is right the public is forced to take it. The time has passed when this can be done; and in fact Mr. Anderson stated that he did not believe he was exaggerating when he stated that the attitude of the automobile engineer is the only thing that has not changed in the industry during the past decade.

The salesman of to-day is just as technically trained as the engineer. He can tell just what the effect of any given set of words will be and a great many other problems in sales psychology which are just as intricate as those of the engineering laboratories. The salesman knows the cars that will sell best because of his contact with the public, and consequently it is advisable that the engineer keep in close touch with him in order to produce a product of the higher success. The present-day buyer is a better buyer now than he was a year ago. The buyer of to-day will pay the price, but he wants efficiency for it. He wants economy, and he wants a dollar's worth of car for every dollar spent. This continual talk of thrift has had its effect on everybody. Everybody who buys to-day wants to justify his expenditure in his own mind. He wants the style, but good style must be in conformity with good taste, because good taste remains good longer than any fad. The buyer of to-day wants durability, he wants simplicity, and cars are selling to-day which base their entire selling arguments on performance and economy.

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Preparing Budget of Steel Needs

WASHINGTON, May 24—An estimate of the steel production of the United States for the year and the budget of war needs for the government is being prepared by the War Industries Board. It will be completed early in July. No cur-

tailment of so-called non-war production will be ordered until this budget is finished, and the exact requirements are known.

Steel manufacturers demanded this budget, when asked by the government to curtail steel shipments to non-war industries. They are confident that their plants can more than meet the war requirements and for that reason asked for the budget.

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To Maintain Present Copper Price

WASHINGTON, May 24—The price fixing committee of the War Industries Board recommends the maintenance of the present maximum price of copper, 23½ cents a pound, for the 75 days beginning June 1. No official announcement has been made, and final decision rests with the President, who will shortly issue a proclamation.

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Perfect Aeronautics Division Organization

WASHINGTON, May 24—The general staff officers of the army are perfecting the organization details of the new Aeronautics Division formed by the recent Presidential proclamation. Secretary Baker states that many of the officers attached to the Signal Corps will be transferred to the new organization and identified by a new insignia yet to be designed. The Division of Aeronautics will have entire charge of flying at the battle front. It will train and designate pilots who are to fly balloons and airplanes, and will shortly take over all of the flying camps in this country.

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Cars May Travel On Nantucket Island

BOSTON, May 25—After 12 years of agitation, motor cars are now allowed to travel on Nantucket Island, the sole place in New England from which they have been excluded. A vote was taken on the measure last week and 336 voted for the measure and 296 against it.

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Enterprise Foundry Nearly Ready

SUPERIOR, WIS., May 27—A gray iron foundry is being completed here by the Enterprise Foundry Co., which has been organized by S. A. Riches of Superior and local associates. The foundry will occupy a 2-story concrete building at First Street and Ogden Avenue, and is expected to be in production within 5 weeks.

Plan More Airplane Mail Routes

Mail Carrying Planes to Operate Between New York, Boston, Chicago and St. Louis

WASHINGTON, May 24—The Post Office Department has planned extensions of the airplane mail service. Mail-carrying airplanes will operate between New York and Boston next fall. A third route will later be established between Chicago and St. Louis. The planes have already been purchased for the New York-Boston route, and weather conditions of New England are being studied. Schedules will be operated between New York and Boston in conjunction with the Washington-New York route and will effect a saving of 4 hours in mail delivery as compared with railroads.

Owing to the unfavorable weather conditions which have delayed airplane mail service, the machines will be equipped with instruments for calculating wind, velocity, driftage, etc. Landing fields will be scattered over the entire routes so that fliers can sail along close to the ground if necessary.

Post office officials are confident that the aerial service will be self-sustaining. Under the present arrangement the War Department furnishes the fliers and machines and pays the cost of up-keep. The Post Office supplies the landing fields and gasoline. To date the average of 600 letters had been carried north bound between Washington and New York, bringing in $150 a day. The south bound receipts are slightly less.

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Mason Earns 25 Per Cent in 3 Months

KENT, OHIO, May 27—Sales of the Mason Tire & Rubber Co. during the 3 months ended April 30 were $501,540. Net earnings during the period amounted to $63,234. After allowing for preferred dividends, more than 25 per cent is applicable to the common stock.

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Marwin Truck Preparing Plant

KENOSHA, WIS., May 27—The Marwin Motor Truck Co., organized recently with headquarters here, is completing the retooling of the former plant of the Skidd Mfg. Co. for the manufacture of a quadruple drive truck for which the Government is said to have placed a large order. Officers of the Marwin company are: President, William Martinson, Kenosha; vice-president, A. F. Williams, Kenosha; secretary-treasurer, Henry Lundskow, Kenosha; chairman of executive committee, Martin P. Winther; director, N. S. Faucett, Chicago. Mr. Martinson formerly was superintendent of the Nash Motors Co., Kenosha, and is works manager of the Winther company. Mr. Winther formerly was a member of the engineering staff of the Thomas B. Jeffery Co., now the Nash Motors Co., and is credited with designing the Nash Quad. The Marwin company is now marketing a stock issue and Grieb & Greene, Milwaukee, have been appointed fiscal agents.

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Liberty Planes Used in Mail Service

WASHINGTON, May 24—Airplanes equipped with Liberty engines were used yesterday for the first time in the mail air service and established new flying records. Mail which left Washington at 11.30 a. m. arrived in New York at 2.10 p. m., bettering previous records by 40 minutes. The journey from New York to Philadelphia was accomplished in 52 minutes, bettering previous records by 23 minutes. The journey from Washington to Philadelphia was made in 1 hr. and 48 minutes.

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Women's Motor Corps Part of Medical Division

WASHINGTON, May 25—The Motor Corps of America, an organization of women, has been officially recognized by the Army Medical Department, and will be under the jurisdiction of the Surgeon General. This corps has for its duties ambulance service, transportation of sick and wounded to hospitals and searching of women on incoming vessels. The members are volunteers and are expert drivers and mechanics.

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$1,500,000 Surtax Bill Killed

BOSTON, May 25—The bill for a $1,500,000 surtax to be imposed on motorists, a patriotic war tax, was killed by the legislature yesterday. When it was first proposed to pass the bill, James T. Sullivan, motor editor of the *Globe*, discovered it and called a meeting of motor associations. A letter was drafted to Governor McCall protesting against it, thereby giving it the publicity that was needed.

Calendar

RACING

May 30—Avon, N. Y. Community Race.
May 30—Sheepshead Bay, N. Y. Championship races. Harkness Trophy.
June 22 — Chicago. Chicago Speedway.
July 4—Cincinnati. Cincinnati Speedway.

ASSOCIATIONS

June 3-4 — Chicago. National Gas Engine Assn. Eleventh Annual. Hotel Sherman.
June 5-12—Hot Springs, Va., National Assn. Automobile & Accessory Jobbers.
June 17-19—Dayton, O., Society Automotive Engineers, Annual Midsummer Session.

SHOWS

Sept. 23-28—Chicago, National Accessory Show for Fords. Coliseum.
Oct. 14-27—Dallas, Tex. Seventh Annual Texas Automobile Show. Texas State Fair.

ENGINEERING

June 26-28 — Buffalo, N. Y. American Society of Heating and Ventilating Engineers.
Sept. 2 — Cripple Creek, Colo. American Institute of Mining Engineers.
Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg., 29 West 39th Street.